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THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. MARCH 10, 1898. CHICAGO, ILL. NUMBER 10

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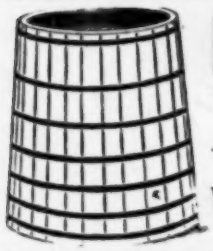

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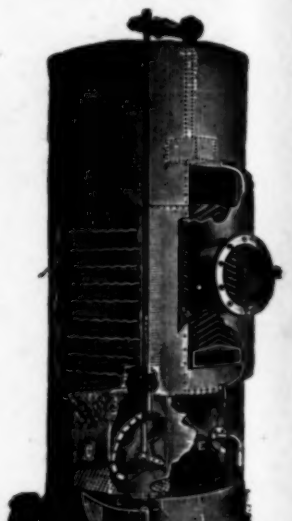

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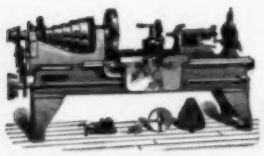

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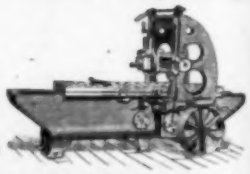

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THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. MARCH 10, 1898. CHICAGO, ILL. NUMBER 10

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

It will take a little time to determine the effect upon the iron market of the earnest preparation for war that has absorbed the country's thought in the past few days. To make millions available for defense is generally the surest way of averting war. Speaking purely from the standpoint of business, the action at Washington this week has been both favorable and unfavorable. The iron trade will profit directly by large expenditures for munitions of war. And whatever comes out of the crises that are crowding each other of late, some part of the $50,000,000 to be at the President's disposal will go into steel. And the stimulus recent events give to battle-ship building and to the enlargement of plans for coast defense, means liberal appropriations for some years to come for army and navy, and hence a demand for iron and steel much beyond what would have been counted on, under other circumstances. The effect of the imminence of war on the iron trade in the next few months is not easily measured. The timidity of capital in such crises is sure to be felt, in a degree, in industry. It does not appear now that the large inflow of business from railroad and agricultural sources is being checked, or that the ordinary channels of demand are being contracted. The belief that war will be averted is strong enough to keep routine buying up to good proportions. But any check that may come to new undertakings, which were expected to materialize with the spring months, is yet to be gauged. The past week has been generally without incident, as to demand or prices. Pig iron has been inactive in most centers, Chicago having probably the best business, and that almost entirely in Northern iron. Southern sellers who are parties to the new agreement have had a quiet week. Sales of outside irons have been at cut prices, but these furnaces are thought now to have orders enough to lead them to maintain the $7.25 Birmingham basis for No. 2 foundry. The agreement provides delivered prices in closely competitive districts, which bring the furnace price down. For example, No. 2 at $10.10 in Northern Ohio means $6.80 at furnace, deducting $3.30, the regular freight. In Bessemer iron there have been some sales, on a $9.75 valley furnace basis for March. Little is doing for second quarter. Furnaces ask $10, and buyers are not willing to pay that. The rumors of a renewal of the proposition mooted at intervals in the past few years, for a better understanding between producers of pig iron in the Central West have yet no more definite basis than on other occasions. The Southern organization might open the way for such a movement, however; though Bessemer pig iron is the particular product on which a Northern agreement would be of service. The wire consolidation, from being dubious last week, seems now to be in a hopeless condition. However, options run until April 1 and a new arrangement, including some of the interests heretofore talked of, may be devised by that time, as referred to in another column. At the last the split was on valuations rather than upon the providing of capital. Wire nails, which went up to $1.50, Cleveland and Pittsburg early last week, are again $1.45. Rods, however, are thus far unchanged by the failure of the consolidation plans. Steel billets are stronger and the heavily sold condition of Pittsburg, Wheeling and valley mills on billets and sheet and tin plate bars for second quarter, has put prices for billets at $15.10 to $15.25, Wheeling, while $15.50, Pittsburg mill, has been paid in the week. Plate mills are well booked and prospective demand for plates is promising; structural mills are figuring on a large tonnage, but have no great amount of work ahead. Prospects for spring building operations are good, barring war impediments. Bar mills are running close to orders, and prices show it. Pittsburg manufacturers are quoting from 97½c down to 90c for steel, according to the amount of business ahead. Valley mills present about the same range of price on iron. For the moment, both in pig iron and rolled material, with a few exceptions, production seems to be the heavier side of the scale.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
807 TRADESMEN'S BUILDING, March 9.

Whether the result of war talk or not, iron and steel circles for three weeks have been quiet. Steel billets and sheet bars are exceptions and both are well sold for the half year. Wire rod pol negotiations are off in their present form and unless a new tack is taken the scheme is dead.

PIG IRON.—There has been no movement in Bessemer iron large enough to fix market prices for ten days, and iron for second quarter is held at $9.75 to $9.85 valley. There is some prompt iron available, but in small quantities, and buying is light. Foundry irons are slightly stronger, and Pittsburg selling interests will not shade $10 for No. 2. We note a sale of 1,000 tons of extra No. 2 at $10.25. Quotations are made as follows:

Bessemer, second quarter valley	$ 9.75
Bessemer Pittsburg, second quarter	$ 10.40 to 10.50
No. 1 Foundry	10.40 to 10.50
No. 2 Foundry	10.00 to 10.15
No. 3 Foundry	9.50 to 9.75
Gray Forge	9.00 to 9.15

BILLETS.—In the Wheeling district $15.25 mill is the best price offered, and in Pittsburg the sales reported are at $15.50, maker's mill. On inquiries for steel during the week a number of mills could promise no deliveries before July 1. The situation is tightening and a shortage seems probable.

SHEET BARS.—Tin bar sales have been heavy for two weeks and more good tonnages are pending. For tin bars $17.25 maker's mill is asked and $17 for sheet bars. A large conversion deal involving a considerable part of one mill's supply of tin bars is a rumor of the week.

RODS.—The end of the wire consolidation scheme—for the present at least—has not affected rods which are still quoted at $22.50 and $23.

STRUCTURAL MATERIAL.—Aside from estimating on innumerable projects involving structural materials that may develop later, mills are not busy. There is little to test price agreements, which are so far said to be intact. There is no decrease in the demand for universal plates and capacities three months ahead are taken. Shapes are quoted as follows f. o. b. mill: Beams, 3 to 15 inches, 1.15c; 18 to 24 inches, 1.25c; zees, 1.15c; tees, 1.20c. Universal plates in connection with other shapes are selling as low as 1c; alone, 1.10c.

IRON AND STEEL SKELP.—Locally skelp is weak and Wheeling district prices continue low. A new skelp mill is planned at the Sharpsville plant of Moorhead Bros. & Co. We quote Grooved steel skelp, 90c to 95c; sheared steel skelp, 1c to 1.07½c; grooved iron skelp, 1.05c to 1.10c; sheared iron skelp, 1.12½c to 1.15c.

SHEETS.—At the annual meeting of sheet manufacturers, held in Pittsburg, Tuesday, reports were of a more encourag-

ing nature than recent rumors of low sales would justify. The belief is common among the manufacturers that some of the sales reported did not so occur, and that concessions occasionally made by mills to secure a desirable gauge have been taken as a basis for reporting prices on other gauges. On the week's business 2c for No. 28 has been the general quotation, with 1.95c reported on some business. Galvanized is quoted at 80 and 5 to 80 and 7½ per cent off list.

TRACK MATERIAL.—On track material we quote as follows: Iron track bolts, 1.65c to 1.70c; steel spikes, 1.45c to 1.55c; splice bars, 1.10c to 1.15c; links and pins, 1.20c.

PIPES AND TUBES.—Jobbers in merchant pipe have begun to buy, convinced that prices can not go much lower. A number of heavy buyers have bought in the last few days. Talk is also plenty of gas projects involving pipe in quantities. Oil country trade has not opened yet under stress of bad roads. Base discounts are as follows: Butt weld, black, 57 per cent off; lap weld, black, 67 per cent off; butt weld, galvanized, 50 per cent off; lap weld, galvanized, 55 per cent off. The additional discounts are 6 tens and 5 per cent on small lots and 6 tens and 7½ per cent on attractive orders. Discounts on merchant boiler tubes are as follows: 2¼ inch and smaller, 72½ per cent off; 2½ inch and larger, 75 per cent off.

BARS.—Prices quoted on steel bars vary. The better filled mills are asking 1c and 1.05c; others ask 95c and 97½c, and one interest, at least, quotes 90c. The condition of order books seems to be the basis for prices. Bar iron from the valleys is quoted at 95c. Branded muck bar iron borings, 1.30c and 1.35c.

FERRO-MANGANESE.—Ferro-manganese has been shaded less of late than heretofore and is held firmly at $47.50 and $48 for 80 per cent domestic.

OLD MATERIAL.—Wrought scrap has been the most active feature of old material for a week, sales ranging between $11.50 and $11.75, net, in the valleys. For cast scrap, $9.25, gross, Pittsburg, was done, and $10.75, Pittsburg, on steel rails. Other prices are: Old steel rails, $13.85; short length steel rails, $11; coil spring, $11.25; car wheels, $10.35, gross; wrought turnings, net, $7.75; heavy metling stock, $10.50; cast borings, $6.25; heavy busheling scrap, $9.75; crop ends, billets and blooms, run of mill, $11.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1142 MONADNOCK BLOCK, March 9.

The market has been quite active in nearly every branch, and some grades of iron and steel have had good sales. The demand for most classes of material is excellent, and the outlook is encouraging. Sales of pig iron have included several large orders. The B. & O. has bought 10,000 tons of ralis from the local mills, and other rail orders have been closed. Sales of bars were quite large last week. Railroads are asking prices on considerable material for bridges and track elevation, and this, with other sales of plates and shapes, gives a very good total for the week. Consumers are specifying on their contracts for rolled products and pig iron, about as fast as they can get the mills and furnaces to fill their orders, and everything is indicative of a large tonnage of shipments for the next several months.

BARS.—Good sales were made last week of both iron and steel bars. Agricultural implement manufacturers have been large buyers, to fill in, as they find in a number of cases that their contracts placed earlier in the year were not large enough. Wagon makers are in about the same condition, and these have bought largely lately. General business in small lots has also been good. Prices are at last week's level. The sale reported last week, at 95c, is said not to be indicative of the market, as it was an especially desirable order for agricultural implement work. Quotations are made at 1c to 1.05c for common iron; guaranteed is quoted at 1.10c to 1.15c, and soft steel bars at 1.10c.

PIG IRON.—Quite large sales were made last week by the Southern interests, most of them being made by the furnaces that are out of the combination, and at prices somewhat lower than the schedule. Northern furnaces also closed a fair tonnage. The larger part of this was taken by a Milwaukee interest, which is selling iron at 50 cents a ton under the prices of the larger furnace companies in Chicago. Considerable sales of Lake Superior and Southern charcoal iron were also made, the former getting the bulk of the business. Prices on Lake Superior charcoal iron are slightly stiffer than in the few preceding weeks ago, but orders are still taken under quoted prices. Foundries in this district are running full, and are using more iron than for a long time past. This is particularly true of agricultural implement manufacturers, who are getting out more machinery this year than ever. Consumers are taking their iron as fast as it was contracted for, and in many caes much faster. The furnaces have small stocks on hand. We quote:

Lake Sup. Charcoal	$11 50@12 50	South'n Coke No. 3	$10 10@10 35
Local Coke Fdy. No. 1	11 50@12 00	Southern No. 1 Soft	10 60@10 85
Local Coke Fdy. No. 2	11 00@11 50	Southern No. 2 Soft	10 35@10 60
Local Coke Fdy. No. 3	10 75@11 00	South'n Silveries	11 25@11 50
Local Scotch Fdy. No. 1	11 50@12 00	Jackson Co. Silveries	12 50@14 50
Local Scotch Fdy. No. 2	11 00@11 50	Ohio Strong Softeners	12 00@12 25
Local Scotch Fdy. No. 3	10 75@11 00	Alabama Car Wheel	14 00@16 00
South'n Coke No. 1	10 60@10 85	Malleable Bessemer	10 75@11 00
South'n Coke No. 2	10 35@10 60	Coke Bessemer	11 50@12 00

CAR ORDERS.—The large orders recently mentioned have not yet been placed. Several of less importance were closed last week, and small orders footed up a good total. Car material is active and sales are made every week of a good tonnage.

RAILS AND TRACK SUPPLIES.—Besides a purchase of 10,000 tons of rails by the Baltimore & Ohio road recently, several smaller orders were closed last week. Quotations are as follows: Rails, $20 to $22.50, according to specifications; steel splice bars, 1.20c to 1.30c; track bolts, with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.60c to 1.65c.

BILLETS AND RODS.—Local mills are still refusing to consider business, and what orders are given out go to mills farther east. Sales are few, however. The market is unchanged, at $17.50 for billets and $25 for rods.

STRUCTURAL MATERIAL.—The Rock Island track elevation work will take about 3,000 tons of material in the very near future. Bids are being taken on it this week. The Illinois Central is receiving bids on about 3,000 tons of bridge work, which will be placed soon. General business in small lots is satisfactory. Quotations are made as follows: Beams, 15-inch and under, 1.30c to 1.35c; 18, 20 and 24-inch, 1.40c to 1.45c; angles, 1.15c to 1.25c; plates, 1.10c to 1.15c; tees, 1.35c to 1.40c. Small lots from stock are quoted at one-quarter to one-half cent higher.

PLATES.—Considerable business was placed last week, most of it in small lots, although one or two large contracts were given out. The demand continues good. Prices are as follows: Tank steel, 1.10c to 1.15c; flange steel, 1.40c to 1.45c; fire box steel, 1.85c to 5c.

SHEETS.—The inquiry for both black and galvanized sheets is excellent, and last week's sales were large. Quotations are made at 2.05c to 2.15c for No. 27 black, and 80 and 7½ to 80 and 5 per cent discount for galvanized.

MERCHANT STEEL.—The demand seems to be increasing steadily. The sales of the week included several contracts for large lots. Prices follow: Open-hearth spring, tire and machinery steel, 1.65c to 1.75c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.45c to 1.50c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—There is not the shortage in mill scrap noticed two or three weeks ago, and mills have no trouble in getting all they want. Cast scrap is still in small supply, but there is no very large demand. Prices of all grades remain about as at last report. Dealers report a rather small run of orders fo last week. Dealer's selling prices are as follows:

Old iron rails, gross	$12 50@$13 00	Axles, net	$14 25@$14 75
Old steel rails, long, gr.	10 50@ 11 00	Cast borings, net	4 00@ 4 25
Old steel rails, short	9 25@ 9 50	Wrought turnings, net	5 50@ 6 00
Old wheels, gross	11 00@ 11 50	Axle turnings, net	7 25@ 7 50
Railroad forge, net	12 00@ 12 50	Mixed steel, gross	7 25@ 7 50
Dealer's forge, net	10 50@ 11 00	Stove plates, net	6 00@ 6 25
No. 1 mill, net	7 50@ 8 00	Heavy melting steel, gr.	8 25@ 8 50
Heavy cast, net	8 50@ 9 00	Old iron splice b., net	13 25@ 13 50
Malleable cast, net	8 00@ 8 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
27 VINCENT ST., March 9.

Iron ore selling firms quoted prices for 1898 to the furnace companies on Tuesday, the sheets showing the average analyses of 1897 cargoes of all ores having been sent out a few days before. On another page this statement is reproduced entire. Some buyers did not wait to be solicited to buy, but visited Cleveland offices on Tuesday to put in their orders for certain ores of which they want to make sure. Between

200,000 and 300,000 tons were sold in this way. This may sound too much like the old days, when the "selling" of the one or two million tons of Lake Superior ores produced in a year consisted principally in persuading furnacemen to get along with as much less than they wanted as would make the supply go round. But it is a fact that in the case of a few of the most desirable ores, last year's experience will be repeated in 1898—the aggregate asked for by furnacemen will be more than these particular properties can produce. With Mesabi ores and with certain old-range products, also, the talent of salesmen will be fully occupied in finding a market. It does not appear that the effort made in the past few weeks to get Mesabi producers to come to some agreement among themselves will succeed for this year; but if 1898 repeats the performance of last year, when the prices set by one interest having its own railroad were so low as to amount to a cut in its freight rate, the result may be disastrous enough to bring a remedy by another year. The effort will be to get an advance this year of at least 15 cents for the better Mesabis; some sellers are talking more and may get it. Thus far nobody has been anxious to move. A few weeks will probably develop the course of the big producers more plainly. Prices quoted this week on some of the well-known old-range ores are as follows: Chapin, $2.56, last year $2.40; Rex, $2.34; Palms, $2.60, last year $2.57; Brotherton, $2.74, last year $2.62; Minnesota, $3.36, last year $3.11; Norrie, $2.84, last year $2.65; Atlantic, $2.75, last year $2.50; Chandler, $3.13, last year $2.92½; Aurora, $2.95, last year $2.80; Republic Special, $3.65, last year $3.40; Republic Specular, $3.35, last year $3.17; Republic Magnetic, $3.27; Kingston, $3.17, last year $2.99; Ashland, $2.80, last year $2.66; Pioneer, $3.03, last year $2.87; Montreal, $2.98, last year $2.77; Crushed Champion No. 1, $3.10, last year $2.90; No. 2 Section 16, $3.07, last year $2.90; Harvard Bessemer Hematite, $2.74, last year $2.68; Bessemer Old Mine Hematite, $2.29, last year $2.35; Lake Bessemer, $2.85, last year $2.73; Cleveland Bessemer, $3.29, last year $3.16; Salisbury Bessemer, $2.56, last year, $2.50; Angeline Hard, $3.64, last year $3.46; Angeline Hematite, $2.84, last year $2.82. It will be seen that there is no uniform advance over last year. While the base ore is 15 cents higher than in 1897, each ore takes its place according to actual cargo analyses for last season or the guaranteed analysis for 1898. It is quite well determined by transactions already closed that 65 cents will be the season rate on ore from the head of the lake. Some Marquette business has been done at 60 cents. Five steamers of the Menominee Transit Co. are chartered for two years by the Canadian-Atlantic Co. to carry package freight. One result will be that about 400,000 tons more of the ore of one large house will be placed with outside vessels.

PIG IRON.—Both in Bessemer and in foundry grades the week has been comparatively quiet. The market for Bessemer is in so sensitive a condition that 25,000 tons sold for delivery in the near future would doubtless put up prices. Some March iron has been bought in the week at $9.75 in the valley, but sellers are asking $10 for second quarter delivery. If the reported purchase of 10,000 tons of Bessemer from St. Louis for shipment to Chicago is correct, the valleys may yet be called on to send iron to the West. Foundry irons range from $9.25 to $9.50 in the valley for No. 2, while $9.75 is quoted in some instances. Southern iron, under the new schedule, is delivered in Cleveland at $10.10 for No. 2. Northern gray forge is delivered at valley mill at $8.75 to $8.85, while Southern is 60 to 75 cents higher. Sellers of Lake Superior charcoal are stiffening on prices and present quotations are at 50 to 75 cents above the lowest. We quote f. o. b. Cleveland:

Bessemer, second quarter	10 40	Valley Scotch No. 1	$10 40@10 65
No. 1 Strong Foundry	10 40	Valley Scotch No. 2	9 90@10 15
No. 2 Strong Foundry	9 90	Gray Forge	9 15
No. 3 Foundry	9 40@ 9 50	Lake Superior Charcoal	11 50

FINISHED MATERIAL.—There is a steady run of orders for bars, sheets and light plates. Steel bars have sold at 1c delivered in Cleveland, and on iron this has been shaded. Pittsburg quotations on steel range from .90c to .97½c, and the freight is 8½c. Sheets are quoted 2c to 2.05c, Cleveland, for No. 27 and 2.10c for No. 28. Tin plates are stronger, but the tendency to name low figures for third quarter delivery is affecting second quarter prices. Some tin plate bar orders have been placed, inquiries representing 15,000 tons being up ately. The material for the Rose building, about 2,300 tons, is expected to be placed this week. Prices on shapes are maintained at agreed figures—1.15c Pittsburg for beams. Old material is somewhat quieter and quotations are made at $13.50 for old iron rails, $10 for old steel rails, $8 for cast scrap and $11.25 for No. 1 railroad wrought.

CINCINNATI.

March 9.

For Southern iron the market has been very quiet during the past week. It has been stated that the bulk of the orders placed have gone to two furnace companies in the South, who are said to be shading current quotations, and some low prices have been reported. The representatives of these furnaces say, however, that as soon as orders are booked for certain grades, their prices will be as high as any. Consumption is going on at an enlarging rate, and numerous consumers are asking for shipments faster than deliveries specified in contracts. For the first time in several years, foundries have been so well supplied with orders for castings that they are able to assume an independent attitude. During the period of depression, contractors for machinery castings especially have become more and more critical, and had rejected work that formerly was accepted without question. Foundrymen feel that the limit has been reached and that in self defense they must rebel when requirements are undoubtedly too severe. They recognize that cast iron has its limitations and in several instances have told their customers that rather than grant concessions, they would prefer to have the patterns taken away. It is quite common now to hear a foundryman say that he has so much work on hand that he is obliged to turn down orders. In Lake Superior charcoal irons the tendency is toward higher prices. Nearly all the makers of this class of material have discovered that recent sales were made at less than the cost of replacing the iron. Current prices are from 50 cents to $1 per ton above the lowest that have been made. Some of the largest producers of finished product say that the possibility of war with Spain may have a paralyzing effect on business for several months, but that later in the year there will be a recovery with an unprecedented volume of trade. Others take the view that nothing is in sight to interfere with the largest consumption of pig iron that has been known in our history, at prices fairly profitable to producers. We quote for cash f. o. b. Cincinnati: Southern coke, No. 1 foundry, $9.75; No. 2, $9.50; No. 3, $9.25; gray forge, $8.75; mottled, $8.75; No. 1 soft, $9.75 to $10; No. 2, $9.50 to $9.75; Belfont coke, No. 1, Lake Superior, $11 to 11.50; Belfont coke, No. 2, Lake Superior, $10.50 to $10.75; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Tennessee charcoal, No. 1, $12.50 to $13; Jackson Co. silvery, No. 1, $12.50 to $13; Standard Georgia car wheel, $14.25 to $15.

PHILADELPHIA.

March 8.

The market continues to present the phenomenon, unusua until within a year, of a very large volume of business but at prices which would seem to indicate a great disparity between production and consumption and an eagerness of sellers to get orders There is no such filling up of order books—and apparently no early prospect of it—as makes sellers disposed to hold for a trifle advance. The great desire is to keep operations at the pace of the past few months. This has been possible, too, in most mills, leaving out those running on merchant bars. But prices are still unsatisfactory both pig iron and most lines of finished products. Buyers of pig iron are disposed to shop around for concessions, and generally gain their point. On one contract for upwards of 5,000 tons of iron, last week, the price was cut 35 cents below anything heretofore reported. We quote $11.50 to $12 on No. 1X foundry, $10.75 to $11 on No. 2X foundry, $10.50 on No. 2 plain, $10 to $10.25 on standard mill irons and $9.75 on ordinary mill iron. On steel billets $17.25 to $17.50 is about the range, with no idication of the firmness in steel noted farther west, business being of small proportions. Plate and structural mills are running steadily and the good contracts for shipyard work are expected to be followed by more for building and bridge purposes. The war preparations now under way will be felt, doubtless, in some lines but the net result of the present condition of unrest is difficult to predict. Some establishments will profit by the war talk. It will add to the tonnage of iron and steel, but it may retard individual enterprises in new lines. Quotations on best refined bars are 1.10c to 1.15c; on common, 1.05c to 1.10c; steel bars, 1.10c to 1.15c; plates and angles, 1.15c to 1.20c; beams and channels, 1.30c up to 15 inches.

THE IRON TRADE REVIEW

DEVOTED TO IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES.

PUBLISHED EVERY THURSDAY BY
THE IRON TRADE REVIEW CO.,
CLEVELAND, OHIO.

CLEVELAND, 27 VINCENT STREET.
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807 TRADESMEN'S BUILDING.
JAMES R. MILLS, JR., Manager.

Subscription (strictly in advance), $3 per annum. Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW, through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

MARCH 10, 1898.

MAY-DAY WAGE QUESTIONS.

May-Day, with its usual crop of labor walk-outs, boycotts, demands, and not infrequently of open violence, is not many weeks ahead; and already notes of preparation have issued from various trades councils in the cities. The building trades, in particular, will soon be in the ferment that comes with the return of the season of out-door work. The walking delegate, whose calllng has kept him for some time in the obscurity of lodge halls—"educational," in its way, we presume it should be called—will soon resume his out-door scepter and become again a unique spectacle of the imperialism that exists in the republic only where labor is most highly "organized." There will be costly delays on work that has been brought to the point at which delay will be most embarrassing. Grudging compromises will follow, or stubborn and doubly expensive contests for advantage. And thus, in exasperation, bitterness and bloodshed, the old ground will be fought over and the season wear on, with defeats and dearly-bought victories on both sides. The large cities, as the strongholds of unionism, and as the centers of building operations, naturally become the scenes of the most desperate contests over construction work. The trades councils, which are a feature of city unionism, become the mediums through which thousands of workmen who may have no part in an original dispute are drawn into it through boycotts and sympathetic strikes; and thus some of the most unreasonable positions are stubbornly persisted in, because of numbers and clamor and the sense of power that comes with the association of strong organizations.

Labor is well employed throughout the country to-day, and the average wage-earner, even where part or all of the reductions of the past few years are still maintained, has a larger purchasing ability than at any time in a decade. It is a pity that the present regime of six days work in every week, with pay better in proportion to market prices than in 1892, should be broken in upon by demands that employers cannot grant. Yet the agitator must agitate, and those who follow must obey his calls.

The boiler trade of Chicago is an illustration of the effects of these periodic attempts to change by force conditions which no union can control. The *Boiler Maker*, referring to the demand that will be made by the Boiler Makers' Union in Chicago for an eight-hour day on outside work, says that the forcible demands of the unions have lost to Chicago boiler manufacturers the established trade of years, each struggle leaving employers and men weakened and angered and less able to fight the cause of their troubles. It seems to be overlooked by the labor leaders in the cities that, if instead of fighting the employers in a given trade in a single locality, they directed their efforts to nationalizing their organization and their regulations, they would fare better in the end. To drive trade from a city into outlying districts, as the boiler makers' unions of Chicago have done, is simply to cripple themselves along with their employers. Our contemporary says that "it is unfortunate, but true, that the apparent victories of the men have been turned into defeat, for their occasional triumphs have been followed by closed shops and the transference of the making of boilers elsewhere, as illustrated by the lessening in number of shops in New York, San Francisco and Chicago."

The matter comes back to just the situation with which the foundry proprietors of the country are now attempting to grapple through a national organization. The nationalization of the employes' organizations on the one hand, and united employers on the other—the latter seeking to encourage a proper union among the men and make it useful instead of hurtful—is the plan upon which some better adjustment will come.

THE WIRE CONSOLIDATION FAILS.

Everything is off, in the proposed consolidation of the wire and wire rod interests of the country. This statement might be qualified by saying that while the original scheme, on the original lines, is dead, something may be accomplished in the next three weeks toward a merging of some of the important concerns. But of this there is no certainty at present. An exact statement, though in very general terms, is furnished *The Iron Trade Review* by one of the active promoters of the combination, as follows:

"The reports of the experts as to the earnings of some of the companies do not verify the representations which were made, and the properties of these companies will not be purchased. Therefore the consolidation as originally contemplated will not be consummated. It now seems certain that a consolidation of some, if not a majority, of the companies will be made about April 1."

The names of the companies referred to in the above are not at present available. It is understood that there was a wide gulf between the valuation put upon the properties of an important Eastern and Western interest and the figure which the company insisted upon—the difference between $6,000,000 and $8,000,000, according to some reports. This was the greatest, but not the only difference which required to be readjusted. The capital to carry through the scheme was fully arranged for, it is said, but the bankers refused to underwrite on the basis of the figures set by certain companies. The lat-

ter appeared not to consider the advantages offered by the consolidation to be attractive enough to warrant the concessions in values they were asked to make.

The amount of time and money spent thus far upon the project, and the fact that for several years the need of better adjustment in the wire trade has spurred manufacturers to one and another scheme of association, argue for some outcome of the present effort. Another week will show more clearly than can be judged to-day whether there is a chance for the partial amalgamation now contemplated.

Thus far the market has not shown any effect of the failure to reach agreement at New York; perhaps because the trade has not been informed of the real outcome of last Saturday's conference. The advance in wire nails which was to be to $1.50 for March, was announced last week, but is now ineffective, $1.45 Pittsburg being generally quoted. It is evident from recent demand in nails and wire that buyers have been keeping close to the market and that stocks are light all along the line

Personal.

John T. Rowlands, for 15 years in the foundry department of the J. I. Case T. M. Co., of Racine, Wis., seven of them as foreman, recently resigned his position there, and has accepted the position of foreman of the foundry of the Grand Rapids, Mich., School Furniture Co. Mr. Rowlands' long experience and acknowledged ability will make his services very valuable in his new position.

President Schwab, of the Carnegie Steel Co., has set right New York reports concerning Mr. Carnegie's health. When visited at Cannes by Mr. Schwab, a few weeks ago, Mr. Carnegie was in good health and had been quite well throughout the winter.

Sir Lowthian Bell recently celebrated his 82d birthday, by giving £500 to schools at Middlesbrough and Guisborough, the latter being in the center of the Cleveland mining district.

Obituary.

James H. Carpenter, inventor of the Carpenter projectile, died at Reading, Pa., March 6, of pneumonia, aged 51. He was born in New York, entered the naval academy and served with distinction in the navy during the Civil war. In 1889 he established the Carpenter steel works at Reading, and became general manager. The company has filled large Government contracts for projectiles. Mr. Carpenter retired as manager a year ago, and lately has made experiments in steel in New York.

Isaac A. Sheppard, one of Philadelphia's most prominent citizens, died March 6, aged 71. He learned the foundry business in Philadelphia, and in 1859 founded the Excelsior Stove & Hollowware Foundry under the firm name of Isaac A. Sheppard & Co., later establishing a branch in Baltimore. Mr. Sheppard was especially active in religious, educational and benevolent work, serving seven years as president of the Board of Education. He was a member of the Pennsylvania Legislature for three terms, including the early years of the war. He was one of the organizers of the National Security Bank, Philadelphia, and was its president at his death.

Bethlehem Rail Mill Closed.

It is reported that the rail mill of the Bethlehem Iron Co., which closed down last week, will remain inactive for the present. On the present $18 basis for rails at Eastern mills, there is no inducement to operate this part of the plant. Some of the other branches of the Bethlehem works are producing to their utmost capacity, and in all departments outside of rails demand is excellent.

Sheet Manufacturers' Meeting.

The annual meeting of the Association of Iron & Steel Sheet Manufacturers was held on Tuesday, March 8, at the office of Secretary John Jarrett, in the Conestoga building, Pittsburg. The present board of officers was re-elected, as follows: President, J. G. Bouttelle, of the Piqua Rolling Mill Co.; vice-president, W. T. Graham, of the Ætna Standard Iron & Steel Co.; secretary and treasurer, John Jarrett, Pittsburg. The executive committee is appointed by the president, and consists of five members, as follows: W. T. Graham B. M. Caldwell, Ætna-Standard Iron & Steel Co.; N. E. Whitaker, Whitaker Iron Co., Wheeling; Warner Arms, Falcon Tin Plate & Sheet Co., Niles, O., and A. W. Brown, Cambridge Iron & Steel Co., Cambridge, O. Reports from individual concerns were encouraging, many being booked for some weeks ahead. The ruling list of prices was reported to be, with a few exceptions, holding well and no chages were made. The base price remains 2.05c for No. 28.

THE City Council of Cleveland, at its meeting Monday evening, March 7, by a vote of 14 to 4 rejected the contract with the Addyston Pipe & Steel Co., Cincinnati, to furnish cast iron pipe to the city for 1898, and directed the director of public works to re-advertise for bids. The reason given by members who spoke was that lower bids would be made on the next opening. The Addyston Co. bid $16.73 and the Lake Shore Foundry Co., of Cleveland, $17.45. The object is to give the local company a chance to take the business, now that it has been able to size up the situation. The Addyston Pipe & Steel Co. had signed a contract with the director of public works and insists that the business belongs to it and that it will have recourse to the courts.

E. D. NICKERSON, receiver of the Kellogg Weldless Tube Co., Findlay, O., has issued a revised list of the manufactured stock of the company now in his hands, and appraised at an average price of $75 a ton. The list comprises a large line of seamless tube sizes varying from 1½ inch to 7¼ inches outside diameter, with a considerable range of shell thicknesses. In addition to the tubing, which is adapted to many uses—cylinders, engine shafts, bushings, plungers, chuck tubes, roller bearings, trolley poles, bushings, spindles, roller bearings, pneumatic hoists, piston rods, hollow axles, etc., the receiver has on hand a quantity of fittings, supplies, chain hoists, and sundry tools and appliances which will be disposed of at private sale.

THE preparation of tasteful and artistic name-plates for machine tools, engines, electric motors and other machinery is an adjunct of manufacturing in these lines that calls for no little skill and study. Mr. August Becker, 36 Oliver st., Boston, an expert designer and engraver in brass, steel and other metals, makes a specialty of engraved name-plate castings, index lathe plates and plates for patent dates, in nickel and bronze. The ability to grasp readily an idea as to a proposed plate, that may be merely suggested by the manufacturer, and embody it in a finished design that shall be neat, have well drawn lettering, and sharp, clear, deep cutting, results in the case of this house, from the combination of the practical and the commercial sides of the work. A study is made of the form of reproduction required in each case, special pains being taken to obtain depth and clearance for casting in the sand. Sample plates are shown and information, drawings and estimates of proposed work are furnished by mail or interview.

No. 2 of the 52nd or 1897 volume of the *Journal of the Iron and Steel Institute* edited by Bennett H. Brough, secretary, has just been received in the United States. In addition to the proceedings of the Cardiff meeting of the Institute last August, the volume contains a thorough digest of the various articles that have appeared in the European and American technical press, and the papers read before technical societies, reflecting progress in the manufacture of iron and steel. It becomes, therefore, a valuable record of metallurgical investigation and achievement.

A. W. MCARTHUR, one of the prominent members of the Western Foundrymen's Association, and president for one term, has formed a partnership with A. Sorge, Jr., to handle the high grade steam specialties for which Mr. Sorge has been agent for several years past. The firm will do business under the name of A. Sorge, Jr., & Co., with offices at 1020-1021 Monadnock Block, Chicago. Among other things, the new firm will handle the Cochrane feed-water heaters, steam and oil separators, and Bundy steam traps.

MR. CARNEGIE'S LETTER.

Current Comment on Its Suggestions.

Two Cleveland ship builders comment on Mr. Carnegie's statement, so far as it relates to the economies attainable by shipyards in the United States and to the suggestion that New York and vicinity offers a great field for such industry. Mr. Robert Wallace, president of the Cleveland Ship Building Co., said: "Notwithstanding the difference in wages between this country and Europe, there is, I believe, not the slightest doubt but that modern steel or iron vessles could be constructed in New York or vicinity much cheaper than in any foreign country. Owing to recent great improvements in machinery used in building boats, and the cheapness of steel, the cost has been reduced until there is no longer a question as to our ability to build ocean going vessels of any class at a price which would defy competition. I consider a shipbuilding yard in New York or vicinity, backed by a company with ample capital, one of the safest possible investments, and with assurances of large returns. I believe it will be only a matter of a short time when American built ships will be again supreme on the seas."

Mr. Luther Allen, treasurer of the Globe Ship Building Co., said: "Ship builders have realized for some time past that there is a great field for the location of a large modernly equipped shipyard on the Atlantic Coast, in the vicinity of New York. That such a plant could construct seagoing vessels at less cost than is possible in Europe there is but little doubt, even taking into consideration the pauper wages paid European workmen. If we can sell steel rails and other steel products to Europe, such as is now being done, at a profit, there is no good reason why we cannot successfully compete with Europe in ship building. The vessels of the merchant marine of many foreign countries, however, are granted subsidies, and until our Government extends a paternal hand in the same direction for American built ships, the industry will labor under a disadvantage."

Labor Cost Lower Here than in England.

Mr. Carnegie writes to *The Iron Trade Review* that steel plates for ship building are now $7 or $8 a ton lower in New York than they are in Glasgow, and within a couple of years steel plates can be brought to this port from Pittsburg for $1 a ton, which assumes that they will be carried for nothing from Pittsburg to Conneaut in cars that carry Mr. Carnegie's ore from Conneaut to Pittsburg, and that after the deepening of the Erie Canal the plates can be carried from Conneaut to this port for $1. It is already well known that labor is cheaper in British yards than it is in yards on the Continent, although wages are higher, and that in spite of higher wages here than in England, the cost of labor is little if at all higher here than there. Mr. Carnegie goes beyond this and declares that a new yard near this port equipped with the best modern appliances for ship building would show a lower labor cost than any yard in Great Britain or Germany. In his opinion the maritime supremacy of the United States can be re-established purely as an affair of business, and to the building of merchant ships for ourselves, we could add the building of war ships for all countries that do not build their own.—[New York Journal of Commerce.

A Development for the Future.

The letter of Mr. Carnegie to *The Iron Trade Review*, pointing out the opportunity for profitable industrial development in the building of large shipyards in New York bay or on the shores of the Hudson, is of great interest to the iron and steel industry. Mr. Carnegie is the highest authority on what this country can do in the line of furnishing steel for naval construction, and his declaration that it can permanently supply ship building works at prices that will enable them to compete in the markets of the world points out one direction of extension for the consumption of the product of our mills that has almost infinite possibilities.

At present only a fractional percentage of the immense production of the United States is used for the construction of lake and sea-going vessels. Yet the availability of our product for this purpose is stated by Mr. Carnegie in the briefest terms to the effect that American steel for such purposes can be laid down in the yards 25 per cent cheaper than the quotations now prevailing on the Clyde. It is also significant that one of the important factors in securing that result is the cheapness of transportation by canal, Mr. Carnegie's calculation being at a rate of a dollar per ton by rail to Conneaut and thence by lake and the deepened Erie canal to New York. There is no doubt that these new factors in transportation will greatly aid the reduction of freight charges; but whatever is credited to them must supply an argument a fortiori in favor of increasing the canal from the lake to the ocean to the greatest economic depth, which we believe in that case to be 11 or 12 feet, and of building the Lake Erie and Ohio River Ship Canal.

It certainly is as nearly a demonstrated matter as anything in the future can be that, with these waterway improvements, the district from the Lake Erie ports to West Virginia would become the iron and steel center of the world; and it is not impossible that those avenues of transportation would result in locating a large portion of the world's ship building, not only in New York, but along the Ohio river and the Lake Erie shores.—[Pittsburg Dispatch.

What It Means for Pittsburg.

When Mr. Carnegie expresses himself on a matter concerning iron and steel he generally knows what he is talking about, as he does also on all subjects connected with the industries of this country. What he says, therefore, about the possibilities of steel shipbuilding in America would arouse hopes of a resumption of our former supremacy in the construction of these vehicles of international commerce even were there no other signs, patent to all observers, which go to confirm Mr. Carnegie's statements in the minds of intelligent men. Our recent experience has shown that as soon as we are ready for any industry we take it up with a promptitude and rapidity unexampled in the industrial history of the world. This has been the case with tin plate, with the manufacture of armor, and indeed in the building of iron and steel vessels, for we have already demonstrated our ability in this direction, though our operations have not as yet been extensive enough to bring us into prominence abroad. It must be remembered, however, that the exceptionally favorable conditions to which Mr. Carnegie calls attention, namely, the ability to manufacture steel cheaper than Europe, are of such recent occurrence that we have as yet scarcely been able to realize all that they mean to us and our industries. Nothing is more probable than that in a few years, with Pittsburg furnishing the steel and the skilled workmen and machinists of the coast fashioning it, we will be as great a factor in the ship building trade as we were in the days of wooden keels.—[Pittsburg Times.

A London engineering paper says that the Japanese Government will place orders in England for material and machinery to be used in an immense iron foundry constructed by the State. It is expected that the orders alone will involve an expenditure of $2,250,000. The paper advises British manufacturers to do all in their power to obtain the contracts, for it is quite possible American competition may be stronger than they have any idea of, and probably divert the trade.

An index to the condition of the railroads and to that of trade throughout the country is found in the recently published annual report of the Pennsylvania Railroad. The Pennsylvania line proper shows a surplus of earnings amounting to $2,881,000 (over the 5 per cent dividend) against a surplus the year previous of $766,000; whilst the operated lines exhibit a surplus of $2,336,000 compared with $675,000 last year; making a total surplus of $5,217,000 against $1,441,000 for the year preceding.

R. D. Wood & Co., of Philadelphia, have secured a contract for supplying about 552 tons of 3, 4 and 6-inch cast iron pipes and fittings for the Hasting's Corporation, London. The prices obtained for the pipe are said to be £5 5s for the 3-inch pipe, £5 for the 4-inch and 6-inch, and £9 for the fittings.

The new sheet mills of the Scottdale Iron & Steel Co., at Scottdale, Pa., are about completed and will be started soon. Large contracts have been received and the mill will be run to its full capacity for several months.

ACID VS. BASIC OPEN-HEARTH STEEL.

The provision of the specifications for the new East River Bridge towers and trusses requiring all steel to be made by the acid open-hearth process was attacked in the courts last week, and an injunction was sought on behalf of a taxpayer restraining the commission from limiting the bidding to makers of acid steel. The court, however, refused to issue the injunction, and in its opinion said:

"This action is commonly known as a taxpayer's action, and is authorized by the statute, but it can only be maintained to restrain threatened waste or injury to the estate, funds and property of the municipality, and it has been repeatedly held that it is necessary to allege and prove fraud, misconduct or bad faith on the part of the officers sought to be restrained. I have carefully examined the papers presented to me, and I am convinced that a difference of opinion only is shown."

We believe that engineers generally will approve the soundness of the court's decision. It matters not whether basic steel is as good as acid or not. The responsibility for selecting the material for a structure is rightly placed upon the engineer, and the courts should not and will not interfere with the proper exercise of his discretion. Mr. Buck and other engineers who hold that basic steel is not as reliable as acid, may be, and very likely are, mistaken. There are probably no engineers in any nation more systematic and microscopically thorough in their tests of material than the German engineers, and the German steel industry is almost wholly dependent on the basic process. Basic steel has been used so long now, both here and abroad, that its use is in no sense an experiment. Granting all this, however, the commission and its engineer, who are responsible for this work, have a right to say what shall and shall not be used, and in the honest exercise of their discretion they should by no means be interfered with by the courts. An engineer may not be infallible in his decision of engineering questions; but we shall make no gain by setting a lawyer to review his decision.—[Engineering News.

So far as we can learn we judge that the engineer believes that the acid product will give greater uniformity and reliability than the basic. By the acid process better stock must be used to begin with, and therefore we can feel safer as to the finished shapes. While it is true that analyses and tests of the finished material can control the product pretty effectually, it is also true that every piece cannot be tested. Starting out with this premise, the engineer assumes that it is to the last degree important to have steel in the anchorages that can be absolutely relied upon. Therefore he would naturally, believing as he does, specify acid steel for this part of the work. It is almost equally important that the steel for the towers should be of the same reliable quality. A defective piece could be discovered and replaced more easily there than in the anchorages, but it is desirable to avoid any appearance of patching the towers, both for good looks and for the effect on the mind of the public. The same reasons would hold, although in less degree, with the superstructure of the approach spans. Thus we arrive at what we judge to be the reasons why acid open hearth was specified. Whether or not these reasons are good and sufficient we do not pretend to say.

If there is any force in the reasons that have been given above, the specifications are right in this respect, unless there is strong reason to the contrary. What is to be said on the other side? We judge that the specification of acid steel does not put out of competition any of the large steel makers. Making acid steel instead of basic is merely a question of changing the lining in the open-hearth furnace, and the cost of this change would be a trifling percentage of the total of a contract of such magnitude. Whether or not it would raise the price of the steel to the city in an unjustifiable degree is another question. The stock for the acid process is more expensive than for the basic. The process of manufacture, however, is cheaper, and, given specifications equally as exacting for one product or the other, it is questionable if restricting the bidders to acid steel would add an unnecessary percentage to the price.—[Railroad Gazette.

MILLER BROTHERS & Co., Tradesmen's Bldg., Pittsburg, have the contract from the Illinois Steel Co. for the brick work for a 250-ton mixer for the Joliet Works.

THE TIN PLATE MARKET.

No new strength has developed in tin plates, and the market remains dull and uninteresting. There has been a fair inquiry for plates to be delivered over next four months and the market may be quoted as 2½ to 5 cents per box firmer than a month ago for these deliveries, but for later deliveries —that is, July to December, offerings are freely made at prices lower than anything offered heretofore. This has had a depressing effect upon the market for near-by deliveries, which otherwise would have been decidedly firmer than it is to-day.

It is generally conceded that the mills are all busy and that the demand will fully equal the consumption during the next six months, and that there is no reason why plates should not be considerably higher except that certain large mills are quoting for futures, deliveries beginning July at very low prices.

The volume of business, owing to the unsettled conditions of the market, has been small and the trade gossip of trust negotiations and of the work of the maker's committee all has an unsettling effect; but no large buying has taken place in anticipation of the probable advance should the trust negotiations result successfully. Consumers take but little interest in this question.

It is rumored that a heavy merchant interest long identified with the tin plate trade is negotiating for the purchase of certain well equipped mills. Failing in the purchase, these parties may erect mills of their own on a sufficiently large scale to offer serious competition to any trust that may be formed. This report cannot be verified up to the present time, but from reliable sources it is believed to be true. There has been no quotable change in the market, which stands as follows f. o. b. Pittsburg or Indiana districts:

CHARCOAL TINS.

	IC	IX
Lisvane Grade,	$3.45	$4.20
Calland Grade,	3.65	4.35

COKE TINS.

IC, 108 lb.	Basis weight,	$2.95
100 lb.	" "	2.80
95 lb.	" "	2.70
90 lb.	" "	2.75
85 lb.	" "	2.60
80 lb.	" "	2.60

TERNE PLATES.

IC, 216 lb., 20 x 29	$5.85
200 lb. "	5.55

An Important Crusher Decision.

The United States Circuit Court of Appeals handed down an opinion last week at Chicago which is of interest to manufacturers of mining and crushing machinery. The court held that the patent of the Gates Iron Co., issued Jan. 20, 1882, for a grating crusher is invalid. The Gates crushers have enjoyed a practical monopoly in the past. Fraser & Chalmers, Chicago, were sued for infringement and Judge Showalter, in the lower court, held the patent valid. The judges reversing the suit with instruction to the lower court to dismiss are Woods, Jenkins and Dunn. The feature of the patent was a shaft bearing a conical head. The court says it was anticipated by the prior state of mechanics, and says: "Straight and tapering forms of bearing are the more simple, and therefore were probably first in use, and the change in stone crushers from the ball head to the tapering cone was a return from the complex to the simpler form."

THE two lodges of the Amalgamated Association in the Bay View mills of the Illinois Steel Co. have agreed to the establishment of an eight-hour work day in the mills. There was some opposition to the change from a 12 to an eight-hour day from the rollers, some of whom make as high as $500 a month. About 400 men who were thrown out a few months ago by the abandonment of two of the mills will be given employment under the new arrangement, which will go into effect at once. Superintendent Reis of the mills says the company prefers an eight-hour day. "At present we are working in 12-hour shifts and we find that the last two hours are practically lost. The men can do more and better work by working eight hours."

INDUSTRIAL NOTES.

Car and locomotive building. The Erie road has placed an order with the Michigan-Peninsular Car Co. for 1,000 box cars and 1,000 twin hopper gondolas for coal and ore trade. The Terre Haute & Indianapolis is getting bids on 80 coal cars. Mobile, Jackson & Kansas City will ask bids on 6 passenger and 50 box cars. For the Puritan Coke Co., Pittsburg, 200 coal cars will be ordered. Union Pacific has placed 500 box and 500 stock cars with the Michigan-Peninsular Car Co. and 150 furniture cars with the Missouri Car & Foundry Co. St. Louis Southwestern has ordered 200 stock cars from the St. Charles Car Co. and 300 from the Missouri Car & Foundry Co. The Lima Locomotive & Machine Co. will build 500 coal cars for the Wheeling & Lake Erie. Columbus, Sandusky & Hocking needs 500 box and coal cars and receiver's petition for leave to buy them is pending. The Michigan-Peninsular Car Co. has an order for 100 furniture cars for the Chicago, Rock Island & Pacific. The Reading Road has placed an order for six passenger and nine freight engines with the Baldwin Locomotive Works. The same works are building two engines for the West Virginia Central & Pittsburg road. The Chicago Great Western will soon buy several engines. The Chicago, St. P., M. & O. has ordered 11 engines from Schenectady, N. Y. It is reported that the appropriation for Russian State railroad locomotives is $10,000,000 for 1898, and that works in other countries than Russia will get some of the work.

The Shenango Steel Co., New Castle, Pa., will receive shortly a large shipment of tin plate machinery, 27 cold mills and 20 hot mills, from Mackintosh, Hemphill & Co., of Pittsburg.

At the Ohio Steel Co.'s plant, Youngstown, O., in one turn last week, 391 steel ingots were produced, amounting to 947 tons. The daily production is over 1,800 tons, and the output is shipped at once.

A meeting of Pittsburg and Allegheny iron molders held last week decided to make an effort for the restoration of the $2.75 rate in foundries in that district. A committee of 12 was appointed to take charge of a movement and the effort to secure the new rate will be made April 1, though it is not expected a strike will ensue. It is said that prices have been so reduced in the depression of the past few years that a rate as low as $1.75 has been reached in some shops.

A reversing engine for the new blooming mill of the Carnegie Steel Co. is being built by Mackintosh, Hemphill & Co., Pittsburg. Its cylinders are 50 x 72 inches stroke, and it will be direct coupled to the mill.

A traveling crane for the new station of the Consolidated Traction Co., Pittsburg, will be built by Pawling & Harnischfeger, of Milwaukee. It will have 55 feet span and a capacity of 55 tons.

The Davis & Egan Machine Tool Co., of Cincinnati, has just received an order through its Amsterdam office for several lathes, shapers and heavy screw machines, to be used by the Holland Government. It has also received through its London office orders for lathes, drill presses, planers and shapers, for Greenwood & Batley, machine tool builders, and government contractors at Leeds. Business in this country is also improving, the company having secured a number of large home orders in the past week.

For a week past the bolt makers at the plant of the Oliver Iron & Steel Co., Pittsburg, have been on a strike, and no settlement is in sight at present.

The employes of the steel department of the National Tube Works Co., McKeesport, Pa., have organized a sick and accident society which starts out with a membership of 150.

The blooming mill at the Edgar Thomson Steel Works is being enlarged to accommodate four additional soaking pits that will be built at once. The new pits will be necessary in cases of emergency only.

Lighting Buffalo by Niagara Power.

Within six months the city of Buffalo will be lighted by electricity generated at Niagara Falls, and received in a large new power house at Buffalo. The plant will be one of the best examples of modern electrical practice, under conditions which differ greatly from those hitherto prevailing. In the new station steam will have no place. What work cannot be done by electricity direct from the falls will be obtained from generators driven by special motors which will themselves be driven by Niagara power. All the apparatus at present ordered for this new power house will be manufactured by the General Electric Co., of Schenectady. The first contract made with the Cataract Power & Conduit Co., covers 11 250 k. w. air blast transformers. They will be fed by two independent sets of cables, so that the light and power service may not be interrupted in case of a break-down of one. The total capacity of the plant will be about 5,900 h. p. Thirty arc light dynamos will furnish current for 3,750 arc lamps. The incandescent lights will number about 24,000 and the estimated number of small motors is 600. The company now lights 2,000 arc lamps on the east side and 862 on the west, and the arc light capacity of the plant will shortly be increased. The power house will be so laid out that under a single roof there will be space for three times the amount of apparatus ordered up to the present time. The installation will be unique in that it will be the only plant in the world of this size which will depend upon an outside source of generation for the current which it uses.

New Stove Foundry for Chicago Heights.

The Bonnet-Nance Stove Co., of Quincy, Ill., has closed a contract with the Chicago Heights Land Association for the removal and establishment of its manufacturing business in Chicago Heights, Ill. The foundry building will be 86x450, 25 feet high, with a truss roof the entire length of the building. The main building will be 50x800, two stories high, with boiler and engine house attached, which will be equipped with two freight and passenger elevators, electric light plant, and a 200 h. p. Corliss engine with two boilers. The buildings will be located on blocks 103 and 104, which contain 10 acres of land. The Chicago Heights Terminal Railway is constructing on the premises a system of railway switches which will enable the stove works entirely to dispense with cartage. The raw material, such as pig iron, coke, etc., will be delivered on the cuploa platform by means of an elevated track, and the finished product will be delivered from the warehouse direct to the cars, thus saving the item of cartage. The buildings heretofore mentioned will be ready for occupancy by May 1. The officers of the stove works are: J. J. Bonnet, president; R. W. Nance, vice-president; and Lorenzo A. Bonnet, secretary and treasurer.

CLAY, which is one of the most useful portions of the earth's crust, is found nearly everywhere, but the pure form of it, having the highest refractory properties and burning a dead white color, is rare. When found, we call it kaolin, or china clay. Kaolin is found at Woodbridge, N. J., in South Carolina and other places, but still we import quantities of china clay from abroad, which does not seem quite right. The theoretical composition of clay has been stated by authorities to be 39.45 per cent of alumina, 46.64 of silica, and 13.91 of water, or in round numbers, alumina, 40; silica, 46; water, 14; but this absolutely pure clay is so rarely found in nature, and in such small quantities, as to be reckoned a mineralogical curiosity. The nearest approach to it that we have ever met with on a large scale is at Warrenton, Mo. On the ranch owned by Frank Reifsnider, of Akron, O., there is an immense bed, about 80 arcres in extent, of practically pure kaolin. Analysis shows that it contains alumina, 41.48; silica, 43.56, and water, 14.05 per cent, while the total impurities, consisting of sesquioxide of iron, 0.35; lime, 0.45; magnesia, 0.08, and alkalis, 0.20 per cent, amount only to one per cent, which is found to have no appreciable effect, as goods made from this kaolin burn a pure white, and fire bricks made from it exhibit the highest degree of refractoriness. There will probably be a large demand for this exceptional clay.—[Brick, Chicago.

DE CAMP & YALE, of St. Louis, dealers in pig iron and foundry coke, announce that, on March 1, Frank B. De Camp was admitted to partnership and that the name hereafter will be De Camp Bros. & Yale. On March 1 the firm moved its offices to the new Fullerton Bldg., St. Louis, occupying, in association with the firms of Logwood, De Camp & Co., coal dealers, and McNair & De Camp, lessees of the Missouri Furnace, a suite of seven offices on the 10th floor.

Review of the Technical Press.

[Translations, Condensation and Comment expressly for The Iron Trade Review by Dr. Richard Moldenke.]

Nickel Steel for Crank Pins and Axles. [*Railroad Gazette*, Feb. 25.]—Mr. H. F. J. Porter, of the Bethlehem Iron Co., has an able article on this subject. He states that the best material to sustain severe usage in the nature of alternating stresses is the one possessing a very high elastic limit. Thus steel should be far ahead of wrought iron in this respect, yet some will prefer a fibrous wrought iron whose structure is really due to the slag contained, to steel, because they fear the so-called crystallization from shocks. This crystallization theory is fortunately disappearing very fast, because we now have a fuller understanding of the metals where studied for their ultimate structure. If the elasticity of a metal exceeds the stress it is subjected to by a very large margin, it will last very long, but even the application of repeated stresses far below the breaking point will eventually loosen up the crystals, and overcome the internal molecular cohesion between them. The metal is then said to be fatigued, and breaks. Mr. Porter now goes into the history of the experiments made with the endurance of metals, giving several tables of results. Thus we find that a tension of 55,000 lbs. per square inch would break a wrought iron bar at the first application, but by reducing the load to 51,500 lbs. a similar bar stood 800 applications before breaking. When the load was dropped to 38,000 lbs., 481,000 applications were necessary to produce rupture. Similar results were obtained with bending tests. No two pieces of metal are alike chemically, and if very close, will be quite dissimilar physically, on account of a variation in the mechanical and the heat treatments undergone. Yet with iron and steel it is now known that for a given stress the material will only stand a certain number of repetitions before fracture ensues. If the stresses are applied alternately in opposite directions, as in crank pins, axles, etc , the material will only last half as long as with a steady pull. If now the range of alternating stresses is made low enough, there may be an unlimited number of repetitions before failure; at any rate a very striking increase is noted as the range of stress decreases. Since the usual method of loading a test bar up to the breaking point at the first application fails to give any definite information regarding the strength of the material when subjected to severe and continuous service conditions, a number of endurance tests have been made to bridge over this difficulty. Thus, a tensile test may, when compared with such records, give sufficient information to predict the behavior of the material in service. Endurance tests being long and costly are not suited for commercial work. The records of a number of endurance tests are now given, and commented upon. The gradually progressive alteration or fatigue of a metal does not seem to affect the ultimate strength, elastic limit, or elongation to any extent under ordinary tests. It is therefore to be recommended that for forgings which are to be exposed to alternating stresses, a metal of very high elastic limit be taken, and made of sufficient size to allow them to lie far within this limit. Thus the best metal will be a high carbon steel with a small percentage of nickel. Mr. Porter now outlines the proper method of making a forging, beginning with the casting of the metal. He lays special stress upon the necessity of constant checks and the keeping of records. The rationale of heating processes is dipped into, the results depending so greatly upon the recalescence point of the steel treated. After the fluid steel sets, crystallization takes place, the slower the cooling the larger the crystals. If the cold steel is re-heated above the point of recalescence (between 1,200 and 1,300 degrees F., depending upon the carbon contents), all the crystals are destroyed, the mass becoming amorphous; but upon cooling, a new crystallization takes place, their size depending upon the rate of cooling. In the forging practice, however, this reheating is attended by the working of the block, and this naturally disturbs the crystallization process considerably, in fact if work progresses at one end, the other may have developed fairly large crystals before it is touched in its turn. The result may be that a variety of strains exists in a block of varying structural conditions. This is readily seen by the springing of forgings when machined. The remedy is slow heating to a temperature just above the point of recalescence, or in other words, annealing. To oil temper such a forging, which in this case should be hollow, after heating to the right temperature, it is dipped at once into oil, and then subjected to further treatment to relieve the metal of any hardening effects due to this rapid cooling process. Mr. Porter states that while annealing lowers the ultimate strength and elastic limit of steel, oil tempering not only restores it, but also increases the elongation and contraction very considerably. Since the endurance tests have shown that even the very best of steel will not last indefinitely, it is not surprising that the mortality of the usual run of forgings is very great. In many cases they were loaded up with internal stresses during forging which closely approached the elastic limit, even before they were subjected to working conditions in actual service. Nickel steel seems to be the best material for the conditions described above, as is shown by the toughness of armor plate. Nickel replaces part of the carbon, increases the elongation, and more especially raises the elastic limit. Thus there is insured a combination of elastic strength with ductility not found in any other metal.

Antinonnin and Dry Rot.—*Baumaterialienkunde*, 13, has a short reference on this subject As nearly all our manufacturing plants are troubled more or less with this wood-destroying fungus, a hint of this kind is of value. Once the dry rot attacks beams it becomes a question of immediate removal of the affected parts, or the ultimate loss of the whole roof or floor, for the fungus is very prolific and destructive. The writer remembers a colossal building in New York which was hardly completed when some of the floors gave way. An investigation revealed the presence of dry rot, all the wood had to be torn out and part of the steel taken down. The loss eventually ran up into the hundred thousands. Professors Von Miller and Harz are stated to be the first to use antinonnin for the disinfection of wood, and they attained perfect success The chemical is odorless, easily soluble in water, very penetrating, and a powerful disinfectant even in very dilute solutions. The application is easy, it will kill the dry rot, and when used on sound wood acts as a protection to it. Unfortunately the degree of dilution is not given, though this can doubtless be obtained from the trade.

Handling Tool Steel. [*Iron Age*, Feb. 17.]—Mr. S. K. Stupakoff takes issue with the common practice of comparing the degrees of heat necessary for forging, annealing, or hardening steel, with shades of red. While experienced men can readily learn how to handle new brands of tool steel properly, the knowledge thus gained will naturally be at considerable expense to their employers. Now there are not many experienced workmen in the line of hardening and tempering tool steel, and a better system is therefore needed to enable any one possessing only a moderate understanding to obtain correct results without extended trial. Mr. Stupakoff goes into the rationale of heating processes while at the various shades of red, to show the difficulties one encounters in properly gauging them for practical work. As an offset to these he recommends the extended and continual use of the pyrometer. To do this effectively Mr. Stupakoff proposes an original system of making steel, rightly holding that the maker should give the data necessary to handle his steel with the greatest chances of success. The labels put on at present are sometimes worse than useless, containing no information regarding the actual composition of the steel, and being liable to displacement and loss, saying nothing of the various constructions which can be given to the advice to heat the bar at as low a heat as possible to quench properly. By stamping into the bar the various items to be noted, such as the temperatures for forging, annealing, and hardening, etc., a definite knowledge of the treatment the material is to receive is obtained. This looks like an elaborate system, to be carried out with difficulty; but Mr. Stupakoff gives a very condensed, compact method of doing it, and in any case the subject is well worthy the attention of producers and consumers of tool steel.

Moorhead Bros. & Co., Inc., of Pittsburg, have lately installed a new mill at their Sharpsburg, Pa., plant, and can now roll iron skelp up to 18⅞ and 20¼ inches wide in grooves. Special appliances reduce labor about the rolls to a minimum.

THE FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club, Philadelphia, on Wednesday evening, March 2, with President P. D. Wanner in the chair.

Secretary Evans, after presenting the treasurer's report, showing a balance on hand of $1,659, read a brief letter from W. H. Pfahler, temporary president of the Foundrymen's Protective Association, who was to have been present to explain the workings and progress of that organization up to date. Mr. Pfahler regretted that he was unable to discuss the matter at the present meeting. He added that he had recently visited Cleveland, and found foundrymen there in favor of the plan.

Mr. Evans then called upon the various members present to report upon the condition of trade as they found it.

Mr. Glover: "We are in much better condition than at this time last year, and the prospects are good."

Mr. Marsh: "We are busier, but there's no improvement in prices. Our business is car castings, and pressed steel fittings interfere considerably with cast iron work nowadays."

Mr. Stirling: "We are finding trade better than heretofore, and everything points to a busy summer, but prices are not as high as they might be."

Mr. Pessano: "We are busy, with plenty of orders. It is also encouraging to find that prices are no lower; they are standing still at present, and we hope they will go forward from this time.

Mr. Farquhar, of York: "We do very little foundry work, and that only for ourselves. Our prices are not going down."

Mr. Flagg: "We are in excellent shape. Instead of 36 or 40 molders this time last year, we now employ 70, and we are working at night."

Mr. Ellicott: "The Southwark foundry's condition is 100 per cent better than last year. We are employing 54 molders and are as busy as we can be. We have good prospects and the outlook is very encouraging."

President Wanner: "I am very much pleased with the reports submitted to-night. They are the most favorable we have heard in two or three years. As to the pipe foundry business, it is in pretty bad shape, but the pipe trade is not brisk as a rule at this season of the year."

Secretary Evans read the following resolution: "*Resolved*, That the Foundrymen's Association of Philadelphia expresses its deep regret at the death of William M. Singerly, proprietor of the Philadelphia *Record*, a public-spirited man who had the business interests of Philadelphia ever at heart." The resolution was seconded by Mr. Farquhar, and after brief remarks by President Wanner and Secretary Evans it was unanimously adopted.

Mr. Davis, of Thomas Devlin & Co., then read the following paper, by Alexander Cairns, of Chicago, on

Annealing Malleable Cast Iron Castings:

Castings to be annealed are cleaned in the tumbler, pickled, sand-blasted or not cleaned at all, depending on the shop practice. Small castings, such as saddlery and carriage hardware, agricultural and similar classes of work are annealed satisfactorily with the sand on them. Large castings are milled or cleaned in the tumblers, as a rule, although if packed without cleaning will require re-annealing.

Annealing Furnaces.—The furnaces used to anneal are rectangular in section, about 10 feet wide and 18 feet long and 8 feet high in the center of the arch. The fireplace is set on the inside in one corner of the oven and is usually the dimensions of the grate surface, 2 feet 6 inches by 6 feet, extending upward to within 8 inches of the roof of the furnace. The flues extend along each side, on a level with the floor, the whole length of it, and should be about 4½ inches by 9 inches so that a stock fire brick will just fit them. It often happens that a furnace which is one of a number entering the same stack, will not work according to calculations. In this case the flues are stopped up or left open until the furnace has been found to work right. Various forms of doors are used for these furnaces, that in which the brick are set into a permanent sling being the most common.

Annealing Pots.—Malleable cast iron castings are annealed in rectangular sectioned "castings" called pots, which are set upon a bottom and built four or five high, making one continuous pot from the bottom up. According to the character of the work the continuous pots are divided by setting plates between each of the sections so as to keep the castings separate. They vary in size from 12 inches wide, 24 feet long, 18 inches deep and ½ inch thick for light castings, to 30 inches wide, 72 inches long, 18 inches deep and 1½ inches thick for the larger jobbing and railroad castings.

At times it is advisable to make special sections in the round, square and triangular shapes, when the order on the particular casting will warrant the expense. Such castings for which there are no pots and for which it is not advisable to make them, are bricked up in the furnace with fire brick and firmly bedded in and covered with packing. The bottom plates are made the same size as the pots and from 2 to 3 inches thick and sufficiently high to admit of easy handling with the truck. The pot sections are molded in green sand, cast from the cupola, do not become annealed in use and will last from 15 to 18 heats. In order to secure the best service from them, it is necessary that a fairly good quality of iron be used.

Packing.—Packing is a shop term applied to the class of materials used to pack the castings so they will retain their shape when hot. It is also applied to the materials which answer the above purpose and in addition supply oxygen or have the latter in their composition. There are a number of different materials used for the former purpose which are used principally on light castings; most anything that will stand up well while hot is suitable. Ground, burned fire brick, iron borings and sand are used. As they of themselves are not agencies of oxygen, it is necessary in using them that oxygen be obtained by means of a coating of rust or oxide upon the castings either before or after charging the pots. In rusting them before, much of the oxide becomes rubbed off in packing. Packing the castings wet would do, provided there was some certainty of their being oxidized before heating. Wetting the packing with dilute ammonia is a very sure means and in the absence of anything better than ammonia is the most satisfactory way of handling this material.

The use of this class of packing has evidently been confounded by Mr. Davis in a former paper, with the process described by Forquignon, with which it has no relation, but is rather the Reaumer process, with the source of oxygen formed on the castings by oxidizing them, instead of the packing furnishing the oxygen. Of the latter class of packing, forge scale and hematite ore are used. I am familiar with the former only. It is an iron oxide and becomes more desirable as a packing the longer it is used, for the reason of its finer division and consequently lying closer to the casting. In using this packing on castings cleaned or those having the sand upon them, no effort toward forming an oxide upon the castings is necessary, although the formation of such oxide saves the packing; that is to say, less of the oxygen in the packing is consumed. New or green packing is worked in gradually on the heavier work.

Charging the Pots.—Packing or charing castings in the pots, so they will retain their shape, and not scale or hang while hot, is a process that cannot be well described. In general they should be packed with a view to keeping the packing in close contact with the castings during the settling of the contents of the pot. For instance, flat plates or sections should be packed on edge; if on the side, they will scale on the bottom from which the packing has settled. This explains why some castings scale and others do not, in the same pot. Castings that can be stacked on top of each other having projections or unequal sides are built up from the bottom plate, with a view to balancing the pile. All long sections or castings, if not packed in pots that will admit of placing them horizontally, should be set upon the bottom plate vertically. I have seen castings 5 feet long ¼ inches longer than the pattern, due to being packed some inches above the bottom plate and hung in the pot during settling.

As a general rule there is a relation between the amount of the packing and the castings, or between the oxygen in the packing and the carbon in the casting. There can be a condition, therefore, where there is not sufficient packing between the castings to anneal. This rule is faithfully carried out with the excess in favor of the packing. The packing of the castings is carried upward, with a view to meeting the unequal heating of the pots; that is, heavy castings in the top

and light ones in the bottom, separated by plates when the occasion requires it.

Beginning with the bottom plate, the first pot is usually a new one. They do not take the heat readily on account of the sand upon them, and for this reason should be broken in on top, but owing to their weight it is not practical to use them there. Building or packing continues upward, the pots being placed according to their age, all of them passing out of service as top pots.

The matter of packing castings is attended with many difficulties which materially add to their cost, and which can only be overcome by long experience and observation. The writer has been perfecting a method of annealing castings, on which patents are contemplated, without packing them, which will apply in particular to that class of complicated shapes on which the handling and labor of packing and straightening constitute an important item.

Annealing.—The pots, some 55 to 65 in all, holding from 20 to 22 tons of castings, are set into the furnace with about their bulk between them and its walls. Those containing the heavier castings are placed in the center. The furnace is closed up and firing continued for three days, the door removed and the pots taken out; or, they may be allowed to stand for some time, depending upon what the labor engaged in handling them may be doing.

Under ordinary conditions the first 24 hours' firing shows the pot a red heat. The next day they are at a yellow heat, and the third day they are a bright yellow and can be readily distinguished in the furnace. Firing on the last day stops with the disappearance of carbonic oxide flame. There is no regular length of time for this flame to burn. It depends on the relative proportions of castings to packing or carbon to oxygen. Its disappearance usually is not an indication that thorough annealing has taken place, although it may be, but is rather an evidence that the oxygen in the packing immediately adjacent to the casting has been consumed, spent or used up.

If it were possible to raise the pots to the necessary temperature in 12 hours, annealing would take place just the same. Experiments that accomplished this, but were made with a view to saving the fuel used in the furnaces, were made some years ago in New York State. The pots were set into the flue of the furnace, and as there was no satisfactory way of controlling the temperature at that time, annealing by this means was discontinued. Small or medium-sized castings can be annealed in a few hours by packing in a hand ladle, removing a few brick from the side of the furnace and setting in on top of one of the pots with a pair of tongs.

Large lots of castings are annealed in from one and one-half to two days by selecting the furnace nearest the stack and enlarging the flue area, i.e., taking out a few brick with which some of the flues had been stopped. If the pots are five sections high, the top section only is packed, the lower one being empty, having plates set in between them so as to raise the top pots, as near the roof of the furnaces as practical. As soon as annealing is indicated the firing should slack off and the pots be allowed to soak until the flame has disappeared.

The manufacture of malleable castings without annealing has received much attention from practical men in the business, and one direct result of experiment in this line has been the discovery of a mixture of 1½ per cent of which renders the castings workable to some extent, but they are in no sense malleable. This class of iron has been used in steel ranges and castings wanted in a hurry.

On the whole, the process of annealing is a very simple one, and there are many apparently mysterious happenings that are due to quite simple causes. Owing to the variations in the working of the furnace a heat is occasionally burned in the top pots. This is a matter of firing and is not common in old furnaces that have been experimented with until found to work right, but cannot be avoided entirely in new ones. Heats are often withdrawn and found to be not annealed. This is an evidence that the furnace was not hot enough and that it was not properly watched. Heats of this kind are returned to the furnace and fired over.

At the conclusion of Mr. Cairns's paper, Mr. Davis made the following comment upon it: "The process described by Mr. Cairns, which he thinks I have confused with that described by Forquignon, calls for a little comment. The only reference I made to sal ammoniac was the use of a weak solution on the spent packing, as oxidation of the ferrous oxide proceeds more rapidly if this substance be used. The description that Mr. Cairns gives of annealing a rusted casting in sand, and assuming that the oxygen of the rust oxidizes the carbon is, I believe, based on a wrong theory; that is, so far as concerns actual practice. It is true that Reaumur was led to the discovery of the process which bears his name by noticing that a cast iron plate which had been exposed to the direct action of the fire for a long time while covered thick with oxide on the outside, was soft inside; but I think nobody will contend that this is a practical means of producing merchantable castings. It has been shown (Royston, *Journal of the Iron and Steel Institute*, 1897) that the oxidation which takes place when annealing in sand is due to the diffusion of the air through the charge. As there is a thin film of iron oxide on annealed castings, it is possible that this oxide has acted as a carrier of oxygen; or, to put it in other words, the oxygen of the air rusting the surface of the casting which is in turn reduced, as the carbon diffuses, and so on, making a continuous operation. It should be noted that if the air had nothing to do with the oxidation, as claimed by Mr. Cairns, the thin film of rust on the outside of the casting could furnish but a very small amount of oxygen, and we should expect little less of carbon. As a matter of fact annealing in sand in open pots showed a diminution of carbon from 3.88 per cent to 2.50 per cent in bars ¾ inches thick (*Journal I. and S. I.*, 1897, p. 160). To account for this loss on the theory given by Mr. Cairns, let us assume the rust on the castings is all ferric oxide, which was completely reduced afterwards. I estimate that over 4 per cent of the iron of the casting would have to be rusted to furnish the necessary oxygen.

"The use of the word anneal in reference to malleable castings leads to much confusion, and I have often wished a more explicit term were used. Webster defines 'anneal' as 'to heat and cool slowly for the purpose of rendering less brittle.' If this were all that was accomplished, there would be no need of another term, but the process also includes a partial oxidation of the silicon (changing the combined carbon to graphitic temper carbon), a variable oxidation and removal of the carbon. As the word anneal is commonly used by malleable founders to mean any or all of these, it certainly leaves something to be desired in point of clearness.

Mr. Evans: "When malleable iron castings come out of the annealing pot, isn't it a fact that the packing frequently sticks to the castings."

Mr. Davis: "No, not to any extent. There may be a little slag but nothing of any moment."

Mr. Evans: "How high heat would you have in the annealing pot?"

Mr. Davis: "About 1,600° or 1,700° Fahrenheit."

Mr. Evans: "Would you use bituminous or anthracite coal?"

Mr. Davis: "Bituminous, for all purposes, except annealing, and for that anthracite."

The meeting soon after adjourned to the roof garden, where lunch was served.

ROLLED steel floor plates have been extensively used for some time for engine room and boiler room floors, engine steps and platforms, stair treads and landings, sidewalk doors, fire escapes, and for other service where there is severe wear or where a corrugated surface is desired, to prevent slipping. They have been substituted for cast iron plates in many cases because of their greater lightness and strength, the possibility of straightening them should they become bent, and the ease with which they can be sheared to shape, as compared with chipping and planing in the case of cast iron. Three patterns are made, the ribbed, the diamond, and the checkered. J. F. Corlett, Perry-Payne Bldg., Cleveland, is sales agent for Northern Ohio. The manufacturers, Taylor & Lewis, of Pittsburg, have issued a pamphlet recently illustrating the various uses of these plates, formerly rolled by the Linden Steel Co. and still bearing that company's name.

AT the Penobscot, on the Mesabi range, the mine has been opened up in good shape for extensive mining in 1898. A considerable stockpile has been accumulated.

TEST OF COMPRESSED AIR LOCOMOTIVES.

Two compressed air locomotives which H. K. Porter & Co., of Pittsburg, are building for use in the Rolling Mill mine of the Cambria Iron Co., of Johnstown, Pa., were tested on Feb. 24th at the plant of the company, under the direction of Mr. Porter and Mr. E. P. Lord, superintendent of the works. The locomotives are of the same design and construction as that illustrated herewith. The construction of these locomotives, however, differs with the service required. At the Rolling Mill mine of the Cambria Iron Co. about 2,000 tons of coal are produced in ten hours, and the coal is hauled from 1,500 to 4,000 feet from two adjoining main entrances. The grades are up to 1½ per cent against loads and up to 4 per cent against empties. The weight of empties is 1,700 pounds, of loaded cars 6,100 pounds, and 30-car trains must be handled on grades not exceeding 1 per cent.

The locomotives just completed are 19 feet 5 inches long over all, 5 feet 10 inches wide, and weigh 27,000 lbs. They have six steel-tired driving-wheels, 26 inches in diameter. The cylinders are 9½ inches in diameter and have a 14-inch stroke. The two main air cylinders are 33 inches in diameter and are made of ⅝-inch open-hearth steel plates, sextuple riveted. All threaded connections, etc., are excessively reinforced with steel flanges and the tanks were tested 35 per cent above the pressure they were required to carry. The tanks have a capacity of 187 cubic feet, and allow a working pressure of something over 700 lbs., that pressure being specified. The air from the two main tanks is conducted through connections to an auxiliary reservoir of 8 inches diameter placed below and between them. The pressure in this auxiliary tank can be regulated anywhere from 30 up to 140 or 150 lbs., as required. The air is reduced from the main tanks by a specially designed reducing valve which can be regulated to any pressure at a moment's notice, and when once set, maintains a constant, fixed pressure in the auxiliary reservoir, thereby preventing any undue waste of air by injudicious handling. In case only light loads are to be handled, the pressure can be materially reduced in the auxiliary resorvoir, securing a decided gain in the economical use of the air. In emergencies almost any pressure can be utilized at a moment's notice, without undue heating or loss. In the auxiliary reservoir the air is controlled by a specially designed, differential throttle, admitting the air to the cylinders. The port openings in the cylinders are specially designed for the use of air, and there is practically no back pressure in the cylinders and no trouble has been experienced from freezing of the exhaust. The matter of charging has been reduced to a small item. Tanks have been charged up to 130 cubic feet of air at 600 lbs. in 45 seconds time, including time consumed in making and breaking connections.

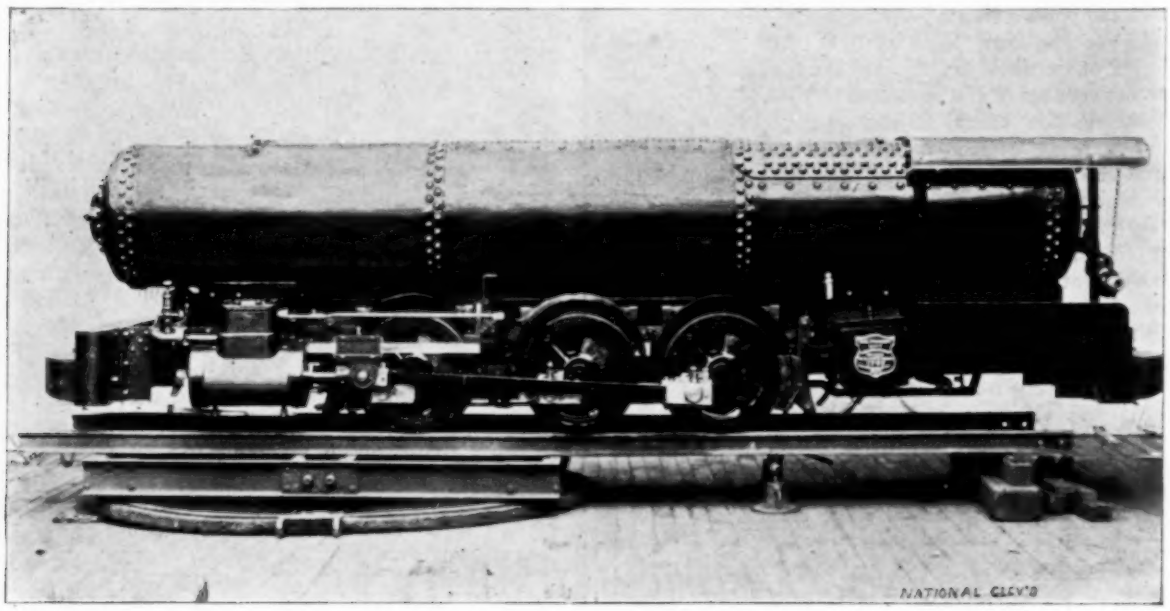


FIG. 1.—PORTER COMPRESSED AIR LOCOMOTIVE.

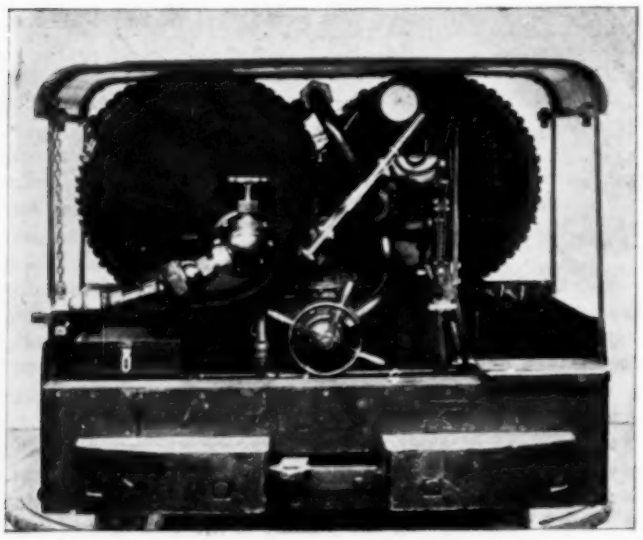


FIG. 2.—COMPRESSED AIR LOCOMOTIVE—END VIEW.

The test referred to was satisfactory in every way and the locomotives will be put into service at once.

The compressed air locomotive has a field of its own which is gradually broadening and including lines of service heretofore open only to steam or electricity. In 90 per cent of the uses to which the air locomotive is put electricity is claimed to be inapplicable. First costs of air plants are so far much in excess of steam and slightly higher than electricity, but this, it is stated, is more than counterbalanced by economies in operation and maintenance.

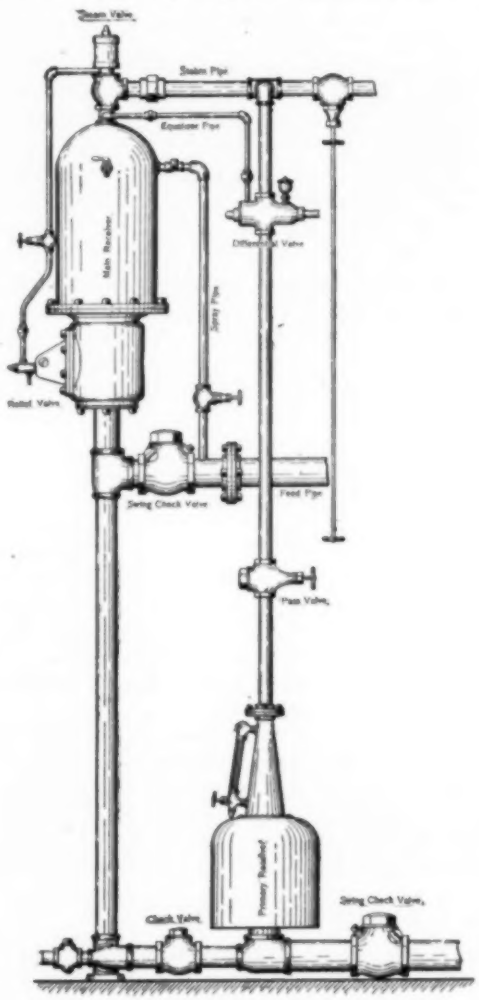
THE Greenville Rolling Mills, of P. L Kimberly & Co., at Greenville, Pa., which have been idle for several years, have started up. A condition of the starting of the plant was that the employes take a certain amount of stock. At a conference held with P. L. Kimberly, the following was agreed upon by the men: "That each employe buy a certain amount of the company's bonds in about these proportions: Puddlers, $200; heaters, $400; and roughers, $200. These bonds to be paid for in wages, 20 per cent being kept back each pay day for that purpose until the whole amount is liquidated. For the first 60 days, however, only 10 per cent is to be paid. Heaters, 5 per cent extra." A dispute over wages last week has been satisfactorily settled.

THE New Castle Steel & Tin Plate Co., of New Castle, Pa., now has 22 hot mills. It will probably place contracts for 10 additional hot mills, making this the largest single tin plate plant in the country.

Q AND C SCOTT BOILER FEEDER.

One of the most recent devices to be put on the market, and one which will interest every engineer who keeps in view the economical operation of the plant in his charge, is the Q & C Scott boiler feeder. This is presented to the consideration of engineers after an exhaustive series of tests under nearly all conditions, by the manufacturer, and it is claimed that its use will be productive of great economy. The catalogue recently issued describes it as follows:

Its functions are two in number; first, to supply boilers with water at a cost much below that entailed by the use of pumps; second, to automatically maintain a constant water level. In its operation an elevated closed chamber is filled with water. Steam is admitted to this chamber to balance the pressure from the boiler upon the feed pipe, and gravity is the sole force employed to carry the water thence into the boilers. Its actions are direct and natural. A few well known forces are applied in a new way. They do the work required without any trouble, just as if they had always been used in this way. Any engineer who has had one of these



feeders applied to his plant will testify to its reliability, economy and convenience, and to the comfort which it has given him. When arranged to take hot water from an open heater, the operation of the Q & C Scott boiler feeder is thus described:

Water from the heater enters and fills the primary receiver by gravitation, and is then driven to the main receiver by steam pressure admitted to the primary receiver through the differential and pass valves. When the main receiver is in this manner filled, the steam valve at the top rises and admits steam to the surface of the water. The pressure above the water balances the pressure from the boiler upon the check valve in the feed-pipe, and the height of the column of water causes it to fall by gravity, discharging into the boiler. During the time when the main receiver is discharging into the boiler, the primary receiver is re-filling, the steam to force the water from this primary receiver being alternately admitted or cut off by the actions of the differential valve.

The motions of this valve are governed by variations of the pressure in the main receiver, communicated by the equalizer pipe, in such a way that while the main receiver contains full boiler pressure, the valve is closed, but when pressure in the main receiver is reduced by a few pounds, the valve is opened. When the primary receiver has re-filled, it awaits the reduction of pressure in the main receiver, which is needed to open the differential valve.

Now, assuming the primary receiver to be filled with water and the main receiver to be discharging, the latter will contain full boiler pressure and the differential valve will be closed. The main receiver will continue to discharge until the water recedes to such a level as to allow the float of the relief valve device to fall. This closes the steam valve above and confines a volume of steam equal to the capacity of the receiver above the water level. At this, natural radiation with its consequent condensation, almost instantly causes a slight reduction of pressure in this receiver below the pressure in the boiler, and this small reduction permits water to be driven back to the main receiver through the spray pipe, which is connected as before described to the boiler feed pipe.

The spray which this returning water forms by impact against a deflecting plate, falls through the steam and instantly causes a much greater reduction of pressure, amounting generally to 30 or 40 pounds and sometimes to a much greater difference. This fall of pressure opens the differential valve and admits lives team to the surface of the water in the primary receiver, and now full pressure in the latter drives the water to the main receiver. As the main receiver fills, its pressure rapidly recovers until it equals that of the boiler. The differential valve then closes, thus allowing the steam in the primary receiver to exhaust and enabling the receiver to re-fill with water, which condenses whatever steam remains, thereby absorbing all the thermal units therein contained. A repetition of these actions makes the operation of the device continuous. The rapidity of the operation, however, varies with the boiler requirements without attention from any one. Though usually arranged to make from two to three discharges per minute, a sudden call upon the boilers will cause the appliance to accelerate its speed of action, while a lesser requirement will correspondingly retard it.

Applications in connection with closed heaters are very frequent. Cold or partially heated water from a tank is received first into the primary receiver, and thence discharged into the closed heater. The main or upper receiver is connected with the heater and receives its supply by displacement as often as a volume of water is forced from the primary receiver into the heater.

When it is necessary to draw the supply of water for the primary receiver from a well or cistern, an air chamber is attached to the supply pipe. With every discharge, water is forced into the air chamber and air is compressed above it A small pipe leading from the lower part of the air chamber, enters the primary receiver and terminates in a spray near the top of the cone. The steam which has performed its work in the primary receiver is condensed and a very effective vacuum is formed, sufficient to draw the supply.

The Q & C Scott boiler feeder is manufactured by the Q & C Co., 700-709 Western Union Bldg., Chicago. The company will furnish details, catalogue, etc., on application.

The Illinois Steel Co's Freight Bill.

The Illinois Steel Co., in its report for 1897, says that it paid in freight on its shipments during the year "between nine and ten millions dollars, or about one-eightieth of all the freights paid in the United States." That is certainly furnishing a great deal of work for the carriers, and as the company turned out only about 1,000,000 tons of finished product, its freight bills must have been a very large proportion of the total value. It is to be remembered that the company smelts the ore and makes the pig iron which it consumes, and that its works are far from the ore beds and the chief supplies of coke. In 1895, when its product was about one-eighth less, it received 4,355,000 tons of raw materials (making 1,000,000 tons of pig and spiegel, and 876,000 tons of finished product). For last year the quantity is not given. Then the distribution of the product in some cases must have cost large sums; for the company shipped its goods not only to every State and territory in the Union, but "to Canada, Mexico, South America, Africa, all the principal cities in Europe, Siberia, Corea, Japan, China and Australia," and "it is almost a daily occurrence to bill goods to points from 5,000 to 15,000 miles distant." All of which is eloquent testimony to the progress made in cheapening transportation.—[Railroad Gazette.

ANALYSES OF LAKE SUPERIOR ORES.

In connection with the quotations of prices for 1898 made this week by sellers of Lake Superior Bessemer ores from old ranges, consumers of these ores have received analysis tables. These contain average cargo analyses of ores shipped from the various mines, Bessemer and non-Bessemer, in the season of 1897. Exceptions to this rule are found in the tables below, where ores are marked thus*. In all such cases the analyses given are those which the ore is expected to average in the season of 1898. In the collection and distribution of the valuable information given below, the Bessemer Ore Association has exemplified one of the prominent objects of its formation:

GOGEBIC RANGE.

ORE.	IRON.	SILICA.	PHOS.	MANG.	ALUMINA.	LIME.	MAGNESIA.	SULPH.	ORIG. & VOL.	MOIST.
*Anvil	62.74	4.09	.055	.82	.92	.47	.11	.018	2.25	12.36
*Anvil, East Vein	61.00	5.25	.068	2.18	.86	.05	Trace.	.014	.....	12.75
*Atlantic	62.79	4.165	.044	1.0380	1.1055	.1950	.1050	.0152	3.020	11.00
*Ashland	62.69	4.50	.035	.25	2.11	.12	.10	.026	.....	11.00
*Aurora	62.44	5.19	.028	.44	1.10	.10	.05	.020	.....	10.00
Buckeye	60.43	6.24	.078	.36	2.10	.40	.35	.014	.....	10.82
*Best	56.17	10.440	.057	.7150	1.2400	.2150	.1525	.0220	3.1650	12.91
Brotherton	62.51	7.50	.035	.42	1.20	.10	.05	.01	1.30	12.27
Cary Manganese	56.08	*	.056	6.52	.....	.....	.....	.....	.....	10.06
Cary Empire	59.90	.....	.057	3.08	.....	.....	.....	.....	.....	9.34
Colby	57.20	3.61	.075	5.85	.98	.14	.40	.006	2.10	9.00
*Cromwell	60.00	3.75	.032	3.10	.75	.10	.13	.010	.....	9.58
*Eureka	61.65	6.75	.066	1.40	.95	.53	.23	.011	1.97	9.80
Iron Belt	62.95	5.05	.040	.44	1.05	.07	.08	.018	.....	10.65
*Lawrence	62.00	5.70	.057	.56	1.25	.10	.08	.009	.....	9.78
*Melrose	62.92	3.15	.030	1.00	.93	.05	.08	.013	.....	9.88
Montreal	65.36	3.40	.040	.30	1.09	.15	.07	.015	.....	8.48
Mikado	59.15	.....	.044	.....	.....	.....	.....	.....	.....	13.00
*Newport	56.00	3.12	.040	7.00	.77	.08	.06	.011	.....	9.94
*New Era	58.00	9.00	.030	1.50	1.23	.43	.16	.005	.....	10.50
Norman (Palms)	62.807	2.980	.0730	.9850	1.1500	.2150	.1600	.0135	3.5550	13.19
Norrie & Palms	63.88	.....	.039	.....	.....	.....	.....	.....	.....	10.31
O'Brien	58.98	12.50	.101	.....	.....	.....	.....	.....	.....	13.85
*Palms	63.03	3.162	.050	.8434	1.0952	.1550	.1347	.0125	3.3625	12.91
*Pearce	58.60	11.44	.062	.64	.81	.22	.13	.014	2.07	7.60
Rand	58.57	.....	.036	3.67	.....	.....	.....	.....	.....	9.95
*Shores	65.00	.....	.025	.....	.....	.....	.....	.....	.....	5.97
Sunday Lake	63.09	8.60	.0265	.39	.90	.36	.14	.010	.82	10.54
Tilden	63.19	.....	.045	.88	.....	.....	.....	.....	.....	13.87
*Toronto	49.00	26.00	.045	.45	1.25	.40	.28	.015	.....	8.80

MENOMINEE RANGE.

ORE.	IRON.	SILICA.	PHOS.	MANG.	ALUMINA.	LIME.	MAGNESIA.	SULPH.	ORIG. & VOL.	MOIST.
Aragon	62.87	4.06	.042	.13	.82	.37	1.74	.007	.....	5.83
Badger	59.60	4.96	.16	.11	2.44	.90	2.99	.088	.....	8.77
Castile	65.64	3.32	.011	.16	1.19	.35	.24	.010	.....	6.42
*Chapin	62.50	4.172	.066	.3782	.9747	.4250	2.0542	.0137	1.3173	6.87
Clifford	42.41	36.45	.014	.06	1.02	.45	.38	.001	.....	3.87
Crystal Falls	58.80	4.25	.785	.90	1.21	2.58	.94	.008	2.74	7.25
Davidson	56.10	6.70	.39	.30	2.98	1.75	2.80	.10	.....	8.35
Dunn	59.250	4.710	.5440	.3395	1.6305	1.7580	.9455	.0400	4.8850	9.03
Elmwood	57.35	6.35	.16	.75	2.25	1.25	3.26	.073	.....	8.75
Florence	47.600	4.340	.3450	.3590	3.1355	1.4300	1.8165	.1635	5.4550	7.41
Grenada	62.92	3.98	.064	.15	1.36	.49	1.41	.015	.....	7.19
Hemlock	59.74	4.49	.235	.....	.....	.....	.....	.....	.....	4.95
*Homestead	54.87	4.68	.086	.38	2.05	3.48	4.87	.003	.....	.....
*Keef Ridge	40.64	37.42	.046	.20	.90	1.35	1.60	.008	.....	2.90
Lerida	63.60	3.82	.17	.19	1.15	.73	1.44	.003	.....	6.64
Loretto	60.173	9.150	.0156	.1960	1.9840	.2800	.5910	.1010	1.1830	9.40
*Mastodon	61.00	4.50	.25	.80	2.75	.50	.720	.075	.....	9.00
*Millie	63.93	3.573	.026	.1423	.9230	1.0800	1.6830	.0036	2.0830	5.74
Pewabic	64.78	4.41	.008	.....	.....	.....	.....	.....	.....	7.87
Pewabic Genesee	45.10	30.95	.008	.....	.....	.....	.....	.....	.....	5.14
Rex	56.96	5.865	.063	1.1105	1.2137	1.3400	4.6625	.0130	3.6150	6.17
San Jose	65.272	3.547	.0127	.1975	1.1172	.1850	.2905	.0495	.7350	8.28
*Sheridan	58.50	6.50	.130	.50	4.00	.60	.70	.250	.....	9.12
Star Ladington	63.370	4.655	.0890	.2542	1.0935	.5100	1.1582	.0082	1.1560	7.75
Toledo	56.18	15.01	.009	.....	.....	.....	.....	.....	.....	6.08
*Tyrone	62.00	3.91	.106	.19	.72	1.30	1.90	.003	.....	.....

MARQUETTE RANGE.

ORE.	IRON.	SILICA.	PHOS.	MANG.	ALUMINA.	LIME.	MAGNESIA.	SULPH.	ORIG. & VOL.	MOIST.
Angeline, Hard	66.30	2.50	*.012	.15	1.75	.15	.04	.015	.60	5.19
Angeline, Hematite	64.40	2.65	.085	.20	1.30	.25	.08	.020	2.20	10.08
*Barnum	65.50	3.49	.075	.36	1.80	.32	.26	.026	.....	.89
Bell	41.875	34.000	.0340	.1710	.8850	.1250	.0830	.0290	1.5200	2.71
*Blue	63.40	5.20	.12	.25	1.96	.55	.72	.010	.....	10.50
*Buffalo	61.80	6.60	.13	.55	1.84	.86	1.16	.003	.....	13.50
*Buffalo, South	61.95	5.70	.115	.49	1.75	.92	.71	.005	1.70	10.90
Cambria	61.60	6.30	.049	.38	1.87	.97	.34	.009	2.10	10.10
*Champion No. 1	63.00	4.16	.044	.09	1.94	.95	.77	.007	.....	.97
*Cleveland Bess	66.08	2.75	.040	.11	.20	.25	.24	.017	.....	1.42
*Cliffs Shaft	62.42	3.65	.113	.35	1.70	1.15	1.00	.090	2.20	1.06
*Essex	60.00	10.25	.110	.30	2.20	.53	.20	.020	.....	.75
*Foster	51.45	18.45	.142	.27	1.10	.18	.30	.090	5.18	2.63
*Harvard Bess. H'm	65.00	2.88	.050	.45	1.64	.53	.18	.018	.....	11.93
*Ishpeming	59.00	6.75	.070	.480	2.18	.220	.400	.010	4.17	12.85
Jackson	56.76	14.30	.059	.15	3.00	.....	.....	.02	.....	4.5
Jack., H No. 2 Bess	50.01	24.23	.047	.13	2.93	.....	.....	.02	.....	2.9
Lake	59.87	5.80	.100	.540	2.61	.440	.630	.015	4.21	12.82
*Lake Bessemer	64.00	4.96	.038	.230	1.05	.310	.170	.029	1.79	10.37
*Lake Bess. E't End	61.34	7.48	.047	.33	2.09	.23	.30	.014	2.94	12.09
*Lake Silica	48.16	25.17	.049	.43	1.69	.36	.47	.035	1.65	11.09
*Lake Sup'r No. 1	65.00	3.40	.100	.23	2.10	.56	.24	.013	.....	1.15
Lillie	61.56	6.10	.078	.09	1.97	.34	.11	.008	3.12	9.90
*Mang'niferous H'm	55.29	6.30	.075	3.75	2.06	.82	2.57	.025	.....	10.00
Marquette	42.953	35.156	.0376	.2820	.7913	.1530	.0940	.3430	1.5660	6.17
*Menabe Friend	39.54	.....	.020	.....	.....	.....	.....	.....	.....	.92
Negaunee, N. Bess	62.05	4.55	.12	.27	2.44	.30	.24	.015	.....	10.54
*Norfolk	56.00	13.45	.045	.11	3.18	.71	1.65	.030	.....	1.63
*Oxford	64.50	4.40	.026	.23	1.80	.25	.23	.013	.....	1.15
*Old Mine H'm, Bess	62.50	3.75	.070	.40	1.66	.42	.14	.011	.....	13.14
*O M. H'm, S. Bess	61.00	5.96	.101	.54	2.13	.43	.23	.018	.....	11.42
Peninsula	59.00	7.35	.11	.30	2.48	.75	.94	.012	.....	14.64
*Prince of Wales	61.55	6.10	.13	.35	1.73	1.40	.46	.012	2.30	13.90
Queen	62.00	5.81	.13	.24	2.16	.44	.23	.012	.....	13.48
Republic, Special	67.13	2.180	.017	Trace.	.651	.100	.140	.014	.800	.60
Republic, Specular	67.34	2.50	.035	.03	.97	.48	.10	.010	.42	1.19
Republic, Kingston	64.83	5.91	.035	.19	.90	.35	.18	.038	.04	1.32
*Republic Magnetic	59.00	2.05	.040	.12	.479	.33	.144	.031	.....	1.00
Salisbury	62.00	4.51	.131	.250	1.84	.370	.140	.023	4.02	13.01
*Salisbury, Bessem'r	62.00	7.33	.048	.200	1.69	.170	.130	.016	2.30	13.60
*Salisbury, Silica	49.31	24.10	.054	.36	2.20	.35	.18	.016	2.30	11.10
*Savoy	60.00	9.25	.020	.34	1.85	.27	.17	.025	.....	2.00
*Sec. 16, No. 1 Bess	65.00	4.39	.016	.36	1.68	.19	.15	.015	.....	4.08
*Sec. 16, No. 2 Bess	62.25	8.43	.034	.25	1.72	.19	.12	.015	.....	3.25
*Sec. 21, Hematite	62.00	4.93	.150	.75	1.26	.43	.37	.019	.....	11.34
Sheffield	60.90	8.95	.025	.12	2.36	.20	.05	.045	1.11	2.95
S. Jackson, Silica	42.56	33.71	.040	1.98	1.58	.....	.....	.....	.....	9.79
*Swanzy	66.00	.....	.045	.....	.....	.....	.....	.....	.....	15.00
Tilden, Silica	41.40	38.75	.028	.100	.56	.180	.070	.018	.47	3.29

MISSABE RANGE.

ORE.	IRON.	SILICA.	PHOS.	MANG.	ALUMINA.	LIME.	MAGNESIA.	SULPH.	ORIG. & VOL.	MOIST.
Adams	63.87	3.14	.035	.41	.95	.25	.12	.035	3.40	8.49
*Amelia	62.51	4.00	.074	.80	2.80	.30	.23	.001	.....	9.80
Allegheny	61.649	.....	.0681	.867	.....	.....	.....	.....	.....	11.071
Auburn	64.65	2.63	.043	.32	1.60	.30	.28	Trace.	2.50	10.12
Audrey	63.74	3.05	.080	.54	1.70	.40	.23	Trace.	4.30	12.94
*Berringer	61.16	4.55	.065	.35	1.60	.11	.07	.012	.....	8.81
Bwabik	63.52	3.75	.033	.50	1.00	.27	.12	.004	3.35	8.30
*Canton	60.80	4.25	.048	.49	.93	.71	.07	Trace.	.....	9.97
*Cincinnati	61.02	8.00	.0308	.75	.98	.34	.15	.015	.....	9.00
*Climax	63.61	1.94	.038	.87	.60	.48	Trace.	Trace.	.....	8.65
Cloquet	61.47	4.30	.046	.54	1.45	.35	.10	.019	5.55	17.17
Commodore	64.10	3.20	.039	.18	1.10	.24	.06	.004	3.40	9.30
*Duluth	63.00	4.00	.050	.30	1.40	.12	.10	.012	.....	8.50
Fayal	62.81	3.87	.033	.87	1.10	.31	.10	Trace.	3.70	9.52
Franklin	63.150	3.775	.0345	.5010	.9355	.1100	.2090	.0115	3.8250	7.53
Genoa	63.54	3.75	.031	.45	1.30	.23	.14	Trace.	3.30	10.41
*Hale	60.00	5.00	.100	.55	.52	1.58	.....	.016	.....	2.00
*Hartley	64.80	3.12	.040	.40	1.47	.40	.19	.003	.....	8.05
Hibbing	63.38	2.40	.030	.39	.79	.13	.07	.014	.....	11.10
Junata	59.585	...	.0817	1.210	.....	.....	.....	.....	.....	10.667
*Linwood	63.59	4.25	.054	.45	1.55	.60	.25	.010	.....	8.95
*Mangan	59.80	5.50	.034	.68	1.52	.32	.10	.....	.....	13.55
*Minnewas	65.50	2.23	.046	.48	1.12	.30	.18	.010	.....	9.00
Mountain	64.197	...	.0447	.581	.....	.....	.....	.....	.....	12.260
Norman	61.56	3.84	.067	.72	2.20	.44	.16	.004	3.66	10.40
Oliver	63.844	...	.0553	.388	.....	.....	.....	.....	.....	11.879
*Pillsbury	63.00	5.40	.030	.40	.80	.15	.10	.012	.....	9.00
Pride	59.596	...	.0822	2.688	.....	.....	.....	.....	.....	9.637
Penobscot	63.518	4.075	.0324	.4750	1.210	.1950	.1000	.0115	2.6150	12.27
*Roberts	60.00	11.02	.0219	.66	.93	.09	.115	.009	1.82	8.705
*Saxon	64.29	3.75	.039	.86	1.21	.13	.04	.....	.....	8.00
Sparta	65.45	2.98	.029	.20	.48	.30	.25	Trace.	2.25	7.00
Sparta Top Bessem.	60.52	6.10	.056	.12	1.35	.51	.32	.007	5.00	9.75
*Tubal	63.25	4.50	.065	.45	1.75	.30	.08	.013	.....	11.54
*Valley	61.03	5.66	.041	.31	.....	.....	.....	.....	.....	12.76
*Vega	61.99	5.40	.040	.26	1.45	.33	.18	.....	.....	11.57

VERMILLION RANGE.

ORE.	IRON.	SILICA.	PHOS.	MANG.	ALUMINA.	LIME.	MAGNESIA.	SULPH.	ORIG. & VOL.	MOIST.
Chandler	65.23	3.51	.036	.23	1.80	.28	.12	Trace.	.85	5.47
*Long Lake	60.59	7.80	.040	.13	1.85	.72	.30	.004	.....	7.55
Minnesota	67.98	1.60	.046	.06	1.35	.47	.11	Trace.	.35	1.02
*Pilot	61.20	9.96	.030	.66	1.62	.31	.10	.008	.....	8.00
*Pioneer	64.80	4.19	.036	.28	1.91	.11	.05	.001	.....	7.47
Red Lake	64.70	4.00	.139	.09	2.05	.70	.30	.007	.75	3.74
Soudan	65.94	3.79	.100	.09	.96	.80	.55	.002	.50	1.44
Vermilion	67.08	2.05	.142	.11	.98	1.92	.24	.004	.41	1.11
Zenith	65.03	3.820	.0310	.1600	1.6800	.4700	.1500	None.	.6500	5.04

The Chapin Mine Hoist.

The chain haulage plant recently installed at the Chapin mine is thus described by *Iron Ore*, Ishpeming, Mich.: "A chain haulage plant has been installed at the Chapin mine, which takes the cars to the shaft and into the level. An old engine has been fitted up, located in the D shaft opposite the Hamilton, and the management believes it will be an improvement over the rope haulage plant now used in the mine. The chain is carried over pulleys in the usual way at a speed of about 100 feet per minute. The cars are provided with a rigid hook riveted to the end and near the bottom of the car, the hook reaching below the line of the car's bottom. To hitch the car on to the chain the latter is simply lifted by hand and dropped upon the hook. The ropes wear rapidly, the clutching device tearing the strands, and it is thought the life of the chain will be considerably greater. The cars are being satisfactorily handled by this plant, and it will probably take the place of the rope. The cars hold something over two and a half tons of ore, and are carried to a tipple shaft, where they are dumped by their momentum into skip pockets, a neat device which is opened for the load to enter the skip by a lever operated by one man, who opens and closes the way by simply turning a wheel. The skip is loaded considerably faster than it can be dumped at surface. The skip used in the shaft is mounted upon a cage frame, attached to the latter by a substantial shaft. In coming to the pocket the skip is deflected from the perpendicular by wheels coming in contact with grooves formed of angle iron, turns upon the shaft, releases its load, and the lowering of the cage brings it back to the perpendicular again and upon the cage platform. The skip holds five tons of ore and dumps into a five-ton car, which is automatically opened at the sides to discharge its load wherever desired by tripping a lever at any given point along the line. The bottom of the cars rises in the center like an inverted trough. There are wings upon the sides of the car that open, and returning the car to the pocket these wings are automatically closed. The car can discharge its load in the ore pocket from which the railway cars are loaded or can be sent out upon the car trestle at will. This shaft can easily take care of all the ore that can be sent to it from the mine. The speed of the chain haulage engine can be increased if desired. The pull is not rendered difficult by sharp turns. For 831 feet the line is a tangent, and the curves are on a radius of 100 feet, these being near the ends of the line."

THE Sheffield (Ala.) Boiler Works, D. W. Burns, proprietor, expects to manufacture steel dumping cars, constructed under a new patent.

MECHANICAL DRAFT.

In the work recently issued by B. F. Sturtevant Co., Boston, going exhaustively into the theoretical and practical phases of mechanically induced draft, a number of cases are cited in which the Sturtevant system is employed. Details are given of the service rendered and the results attained at plants in which the Sturtevant fan was installed and the small short stack substituted for the tall chimney. The descriptions of the apparatus in use at the B. F. Sturtevant Co.'s own works at Jamaica Plain, Mass., and at the Cleveland Iron Mining Co.'s boiler plant at Ishpeming, Mich. Steam from the latter drives the hoisting engines which are part of the complete iron mining equipment of this company.

The Jamaica Plain plant illustrates a number of the advantages of mechanical draft. Radical changes in the arrangement of the works necessitated the removal of the boiler plant to a position over 100 feet from its original location and that of the chimney which had previously served to produce the draft. The distance was too great to permit of the further use of the chimney, and its removal was out of the question. It was therefore permitted to stand as a monument to a discarded method of draft production. A new chimney in the desired location would have cost about $1,450, and would have occupied valuable floor area. It was decided to introduce a fan driven by direct-connected engine and designed to operate on the induced system. Its market value, complete with the stack, was about $700. The fan was placed above the boilers and discharged through a small short stack extending just above the roof. It was provided with a by-pass for emergencies. The relative proportions of the stack and chimney are shown in Fig. 1, which presents a perspect ive view of the front side of the works. The stack appears just beyond and to the right of the chimney.

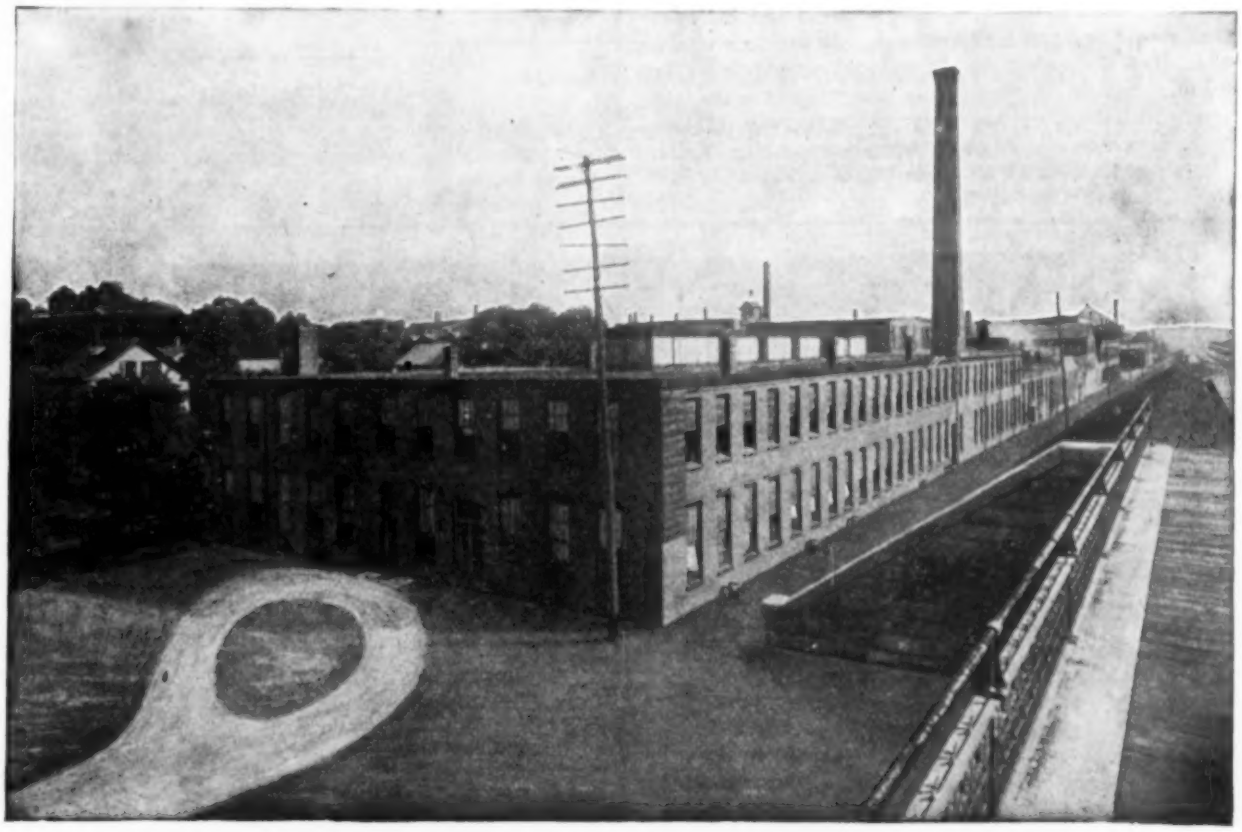


FIG. 1.—MECHANICAL DRAFT STACK AND OLD CHIMNEY AT B. F. STURTEVANT CO.'S PLANT, JAMAICA PLAIN, MASS.

The boiler plant, which is of about 260 h. p. nominal rating, consists of three boilers. Two of these boilers are 66 inches in diameter, each containing 123 tubes three inches in diameter by 15 feet long. The third boiler is 60 inches in diameter, and contains 64 tubes three and a half inches in diameter by 15 feet long. The fan is a special 90-inch Sturtevant exhauster, to which is attached a 5x4 double upright Sturtevant engine. The speed of the engine, and consequently the intensity of the draft, is regulated by a special device which serves to open the throttle and increase the steam supply in proportion as the steam pressure is reduced. It is so adjusted that a decrease of about one pound in the steam pressure serves to change the speed from minimum to maximum, or vice versa.

The Ishpeming plant illustrates the application of a Sturtevant blower in connection with an under-feed mechanical stoker, a type of stoker in the operation of which considerable draft pressure, such as can best be produced by a blower, is an absolute necessity. This plant, shown in Fig. 2, consists of a battery of 72-inch return tubular boilers, equipped with Jones under-feed mechanical stokers, No. 7 Sturtevant "Monogram" blower and a Sturtevant upright engine. The stoker consists of a steam cylinder or ram, with hopper for holding the coal, outside the furnace proper, and a retort or fuel magazine inside the furnace, into which the green fuel is forced by means of the ram; tuyere blocks, for the admission of air, being placed on either side thereof; the retort containing at its lowest point, and at a point where the fire never reaches, an auxiliary ram or "pusher," by means of which an even distribution of the coal is obtained.

By means of the rams, coal is forced underneath the fire, each charge of fuel raising the preceding charge upward, until it reaches the fire; which point it does not reach until it has been thoroughly coked. When in its coked state it is forced upward into the fire. The gases being liberated under the fire, and at that point mixed with air, must necessarily pass through the fire and be consumed; thus giving the benefit of all combustible matter in the fuel. Air is forced, at a low pressure, through the tuyere blocks, under the burning fuel, by means of a blower, operated by an independent engine, or from a line shaft, if such arrangement can be made.

Coal being in the hopper, and the ram plunger at its forward stroke, when more coal is needed the ram plunger is shifted by moving the lever; coal then falls in front of the plunger and upon return movement is forced into the retort; this movement being repeated until sufficient fuel is in the retort. Air at low pressure being admitted into the air chamber and through the tuyere blocks, over the top of the green fuel in the retort, but under and through the burning fuel, the result is that the heat from the burning fuel over the retort slowly liberates the gas from the green fuel in the retort. This gas, being thoroughly mixed with the incoming air before it passes through the burning fuel above, results in a clear fire, free from smoke, and the consumption of all the heat-producing elements in the fuel. The retort being air-tight from below, and the fuel being in a compact mass in the retort, the air

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Harrison Safety Boiler Works, Philadelphia, Pa.

will find its way in the direction of the least resistance, which is upward, consequently combustion takes place only above the air slots. Hence the castings of the retort are always cool and not subject to the action of the fire. The incoming fresh fuel from the retort forces the resulting ash and clinker over the top of the tuyere blocks on to the side plates, from whence they may be removed at any time without in the least interfering with the fire in the center of the furnace, resulting in a high, even temperature at all times.

In the table below are given the results of an extended comparative test, made Oct. 30, 31, Nov. 1 and 2, 1895, between this stoker and hand-firing at the Cleveland Iron Mining Co.'s boiler house:

	Hand-Fired.	Stoker-Fired.
Duration of test, continuous hours	72	72
Average steam pressure, pounds	118.95	118.95
Average temperature of feed-water, degrees Fahr.	210	41.1
Total coal consumed, pounds	50,690	54,864
Total ash and clinker, pounds	8,245	8,202.5
Total combustible, pounds	42,354	46,661.5
Per cent of ash and clinker	16.29	14.9
Total water evaporated, pounds	312,323	341,483
Total water evaporated per pound of coal at observed temperature, pounds	6,176.17	6,226.22
Water evaporated per pound of coal from and at 212°, pounds	6.45	7.57
Water evaporated per pound of combustible from and at 212°, pounds	7.71	8.91
Gain and evaporation, per cent		17.37

In each case the test was made upon two boilers, and the same kind of coal—bituminous slack—was used. The coal consumed in the stoker-fired boilers includes the amount used in a fifth boiler to make steam to run the blower engine. The water evaporated in the fifth boiler is not included.

Outlook in the Boiler Trade.

Prices are a little lower, as they usually are at this season. It is noticeable that the small towns are contributing to a larger degree than the cities, in the way of improvement. The growth of the large shops continues, gradually absorbing the lesser ones. A boiler shop in one of our Western cities has to-day over 500 men on its pay-roll. The capacity of this one concern, by reason of its labor-saving tools, is greater than all others in its State were 10 years ago. There is a general warrant for basing one's plans on a large business next year. Values are low and buyers are plenty. Boiler makers should be very busy, especially those having facilities for making high-pressure boilers.

One of our largest boiler shops here, that usually has an average of six to eight horizontal tubular boilers in process of construction on its floor, has not had an order for such a boiler in two months, and yet it is employing as large a number of men as ever before. Two conditions have brought this about: First, the advantage of lower labor enjoyed by outside towns has made it impossible for shops here to compete, and secondly, the increased use of water-tube boilers has been at the expense of the horizontal tubular boilers in large plants.—[Boiler Maker, Chicago.

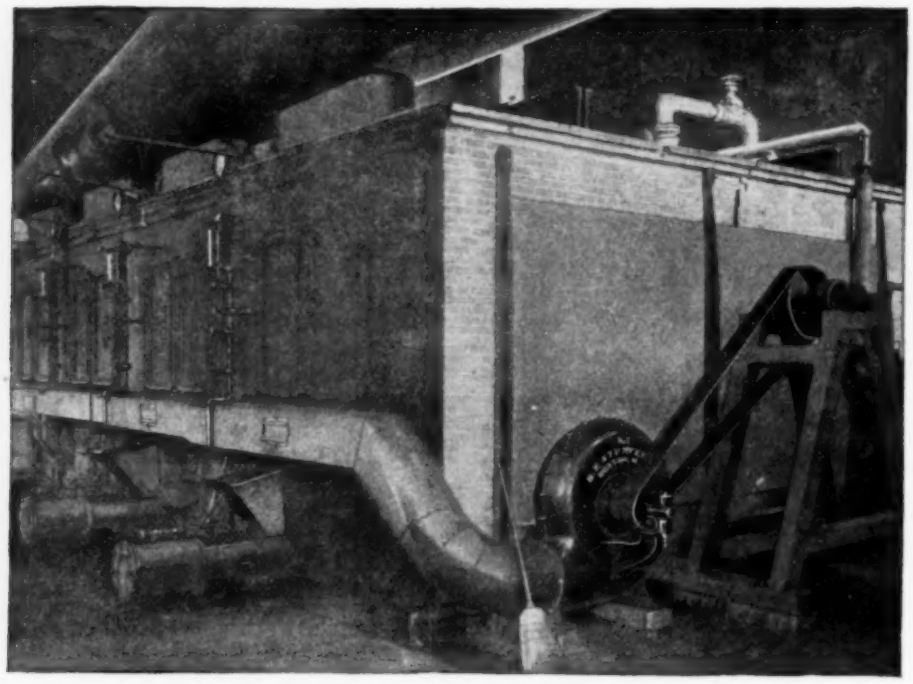

FIG. 2.—JONES UNDER-FEED MECHANICAL STOKERS AND STURTEVANT FAN, CLEVELAND IRON MINING CO., ISHPEMING, MICH.

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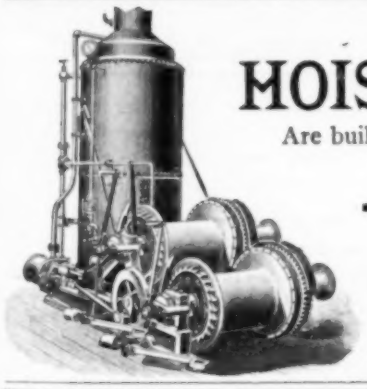

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INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Aurora Boiler Works has been incorporated at Aurora, Ill., with a capital stock of $25,000, by J. W. Battle, John Kelley and B. B. Scott.

The department of public works, Pittsburg, Pa., asks bids for a 250 h. p. boiler for the Howard st. water works pumping station.

The Challenge Machine Co. has been incorporated at Trenton, N. J., to make metal working machines. The capital stock is $50,000, and incorporators are F. M. King, J. W. King, B. F. Baird, and Edward C. Regu, of Philadelphia, and Wm. M. Fixhian, of Camden, N. J.

Bids are asked for boilers for the new plant of the Bullock Electric Mfg. Co., Cincinnati. The contract for the steel structural work has been awarded and bids received for the engines.

The Ensley Co., Ensley, Ala., has purchased a tract of 230 acres of land which it will develop as a manufacturing suburb of Birmingham, six miles distant. The company will arrange for the erection of machine shop, foundry, brick works, planing mill, dwellings, etc.

Bridgeford & Co., Inc., Louisville, Ky., is in the market for complete equipment for the manufacture of steel ranges.

The Collins Colliery Co., Glenjean, W. Va., wants a second-hand 24-inch lathe, with screw-cutting lathe, 10 to 12-foot bed.

B. F. Hudson, Rockport, Tex., asks prices on cornice-squaring shears to cut No. 20 iron 72 inches long; cornice brake to bend No. 20 iron 72 inches long; combined shear and punch; circular shear to cut 3 to 12-inch circle; double-seaming machine and other metal working equipment.

New Construction:—

The Bristol & Plainville Tramway Co. is erecting near Plainville, Conn., a new substantial steel bridge, having a span of about 90 feet. It is now being erected by the Berlin Iron Bridge Co., of East Berlin, Conn.

Roydhouse, Arey & Co., Philadelphia, will erect a three-story machine shop, 100 x 150 feet, for Burnham, Williams & Co., manufacturers of locomotives.

The contract for the Pennsylvania Car Wheel Co. foundry at Pittsburg, for the manufacture of high grade chilled car wheels, has been awarded to W. B. Scaife & Sons, Pittsburg. The main building will be of steel and iron construction, 70 x 266 feet. The work is making rapid progress. It is expected the building will be in readiness for operation in about 20 days.

It is expected that a large building of steel construction will replace the burned plant of the Chautauqua Ice Co. at Pittsburg. The loss by the fire was about $400,000. All the machinery in the old plant was made worthless and will be sold as junk. All the new equipment will be the most improved ice manufacturing machinery.

The St. Louis Car Co. has planned a new car works plant for Baden, Ill. In addition to the building, new equipment of machinery, iron-working and wood-working, boilers, engines, electrical machinery, etc. The plant will have an annual output of 1,000 cars. T. King is general manager.

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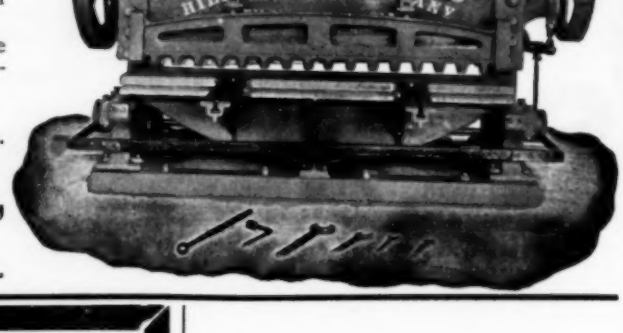

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The Richardson Clutch Mfg. Co., Erie, Pa., has begun the erection of a plant at Grove City, Pa., for the manufacture of an automatic clutch for gas engines.

Additions, Enlargements, Removals, Etc.:—

In addition to the improvements which the Illinois Steel Co. is making at its Joliet plant, it is stated that other changes are contemplated which will give the plant all possible economies in operation. The improvements under way and those contemplated will cost about $350,000. A mixer for direct metal is being put in at a cost of $40,000. An additional rod mill is proposed.

The United States Iron & Tin Plate Mfg. Co., Demmler, Pa., will make some important improvements and additions to its plant. It will install five new hot mills, squaring shears and other new equipment. The additional building will be completed about April 15 and the Riter-Conley Co., Pittsburg, is doing the work. The addition is to be 100 feet long, with a 49-foot span. The present structure is 88 feet long, with a span of 87 feet. A traveling crane, with 10 tons capacity, is also to be placed in position. For this purpose a runway, extending from the old structure to the new mill, is being built. It is to be 263 feet long, with a 70-foot span. The building is to be covered with No. 20 corrugated iron, and the sides are to be of corrugated iron, No. 22. The contract price is $10,000.

The Reeves Iron Co., Canal Dover, O., contemplates enlarging their sheet iron department. Three new sheet mills will be installed and about 100 additional men employed.

The addition to the Buckeye Malleable Iron & Coupler Co.'s plant, at Columbus, O., will be a foundry 250x50 feet.

The Bettendorf Metal Wheel Co., of Springfield, O., is figuring on additions to its plant. One of the buildings will be 175x80 feet.

Fires and Accidents:—

In the converting mill of the National Tube Works Co., at McKeesport, Feb. 26, a ladle of molten metal slipped and a portion of the contents fell on the ground. Several men were badly burned by splashing steel.

An explosion at Hannah Furnace, Youngstown, O., March 2, blew out the bell and hopper so that they rested on the bridge, and stock was scattered about, several workmen being injured.

The pattern shop and store building of the Kansas City Wire & Iron Works at Rosedale, near Kansas City, burned with their contents. Loss, $20,000; insurance, $10,000.

Crank hanger and knife works, Montour Falls, N. Y., burned, with $50,000 loss.

General Industrial Notes:—

At the Cleveland-Cliffs Iron Co.'s machine shops at Gladstone, Mich., a pair of gas engines for marine service have been completed recently. The shop was started to take care of the company's own work but is building up a general jobbing business. Recently inquiries have been received for a number of engines.

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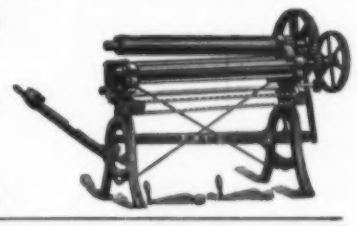

The *Wire Trades Review*, Cleveland, official organ of union wire workers, says that work has not been reported so slack in the wire trades at this time of year, for a long time. This remark must be applicable to wire of the finer gauges. In the lower numbers there has been general activity and in some plants very full employment.

The property of the Los Angeles Iron & Steel Co., Los Angeles, Cal., has been sold under foreclosure proceedings to R. H. Herron & Co., local oil machinery and supply merchants. The price was $150, the purchasers assuming $30,000 bonds and $2,000 taxes. The plant consists of sheet rolling mills, with corrugating and galvanizing departments, and cost $120,000. Los Angeles has an abundant supply of native oil for fuel, the local demand for sheets is excellent, and the purchasers of the plant are hopeful of inducing practical iron men to take it and resume manufacturing.

The Hermann Time Detector Co. has been incorporated at Youngstown, O., for the manufacture of Hermann watchman's time detectors. The device is recently patented and is used, like others bearing the name, for registering the movements of night watchmen in manufacturing and mercantile establishments, hotels, office buildings, etc. It is claimed that this system does away with all complicated apparatus, yet is reliable and proof against the interference of dishonest watchmen. The cost of installation is low, being anticipated by reductions in insurance rates.

The Isabella Furnace Co., of Pittsburg, owning three stacks at Etna, Pa., will increase the height of the stacks, enlarge the width of bosh and increase the number of tuyeres. The combined capacity of the three stacks will be from 1,200 to 1,500 tons per day.

The Ohio Steel Co., Youngstown, O., will build two or more blast furnaces at its plant, to supply its own pig metal. Details have not been settled, but it is likely two furnaces with a total capacity daily of 1,000 tons will be built at once.

At the Pittsburg Wire Works Co.'s plant, Braddock, Pa., in the last week of February, an average daily output for each turn of 300,000 pounds of rods was made. The usual average daily output has been 200,000.

The Lackawanna Iron & Steel Co., of Scranton, Pa., puts in blast Colebrook Furnace No. 2, at West Lebanon, this week

Worth Bros. & Co., proprietors of Brandywine Rolling mills at Coatesville, Pa., will erect a forge to add to their supply of charcoal blooms.

At Calumet, Mich., the two mammoth engines at the Calumet & Hecla mine started hoisting at No. 5 shaft. They have been several years building. Some of the castings came from the Krupp works at Essen, Germany. An endless cable, 6,599 feet long and weighing 22,165 lbs., is employed in hoisting.

The Chicago Shipbuilding Co. launched on Wednesday, March 2, one of the largest vessels for lake traffic thus far built. It is the "William R. Linn," and will be used in the grain carrying trade between Chicago and the Eastern lake ports. The "Linn" is the property of the Elphick Line of Detroit and Cleveland. Its length over all is 438 feet, length on the keel, 406 feet; beam, 50 feet, and draft 24 feet.

The Marine Iron Works, of Chicago, has just built a vessel for the Alaska trade named the "Dusty Diamond." It will be shipped in sections. Its principal dimensions are: Length on deck, 75 feet; length over all, 87 feet; beam at water line, 17 feet; width on deck, 20 feet; draft when loaded, 25 inches.

At the annual stockholders' meeting of the Dillon-Griswold Wire Co., held in its offices at Sterling, Ill., Feb. 7, the following officers were re-elected for the ensuing year: W. M. Dillon, president and treasurer; J. Wool Griswold, vice-president; Wm. H. Shields, secretary. The capital stock of the company was increased from $150,000 to $300,000. The plant is well situated, having the best railroad facilities for taking care of its business in the Northwest, West and South. The company has been running its works constantly day and night since they were first started about two years ago. The product is a full line of wire goods—wire nails, fence staples, barbed wire, bale ties, woven wire fence, annealed, bright and galvanized market wire, etc.

Boltmakers at the 11th and 12th st. plants of the Oliver Iron & Steel Co., Pittsburg, went on strike for a restoration of the 10 per cent taken from their wages last year.

The North Cornwall Furnace, Lebanon, Pa., was blown in Feb. 27.

It is reported that the Carpenter Steel Co., the Midvale Steel Co. and the Firth-Sterling Steel Co. will receive orders for 5,000 armor piercing shells for 8, 10 and 12-inch guns, and for deck-piercing shells for 12-inch mortars. The Carpenter Steel Co. will increase its force from 250 to 400 men. It is expected that the appropriation will be promptly made by Congress, as an amendment to the pending fortifications bill.

The rail mill of the Maryland Steel Co.'s plant which shut down a short time ago, resumed last week, with a number of orders ahead.

The decision of the Michigan State Board of Arbitration in the strike of riveters at the shipyards of F. W. Wheeler & Co., Bay City, Mich., was that the 1897 rate be paid all employes and that the riveters' and setters' wages be $2.50 for a 10-hour day. The company had offered $2.25.

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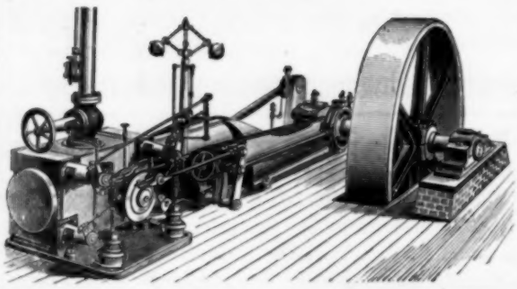

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